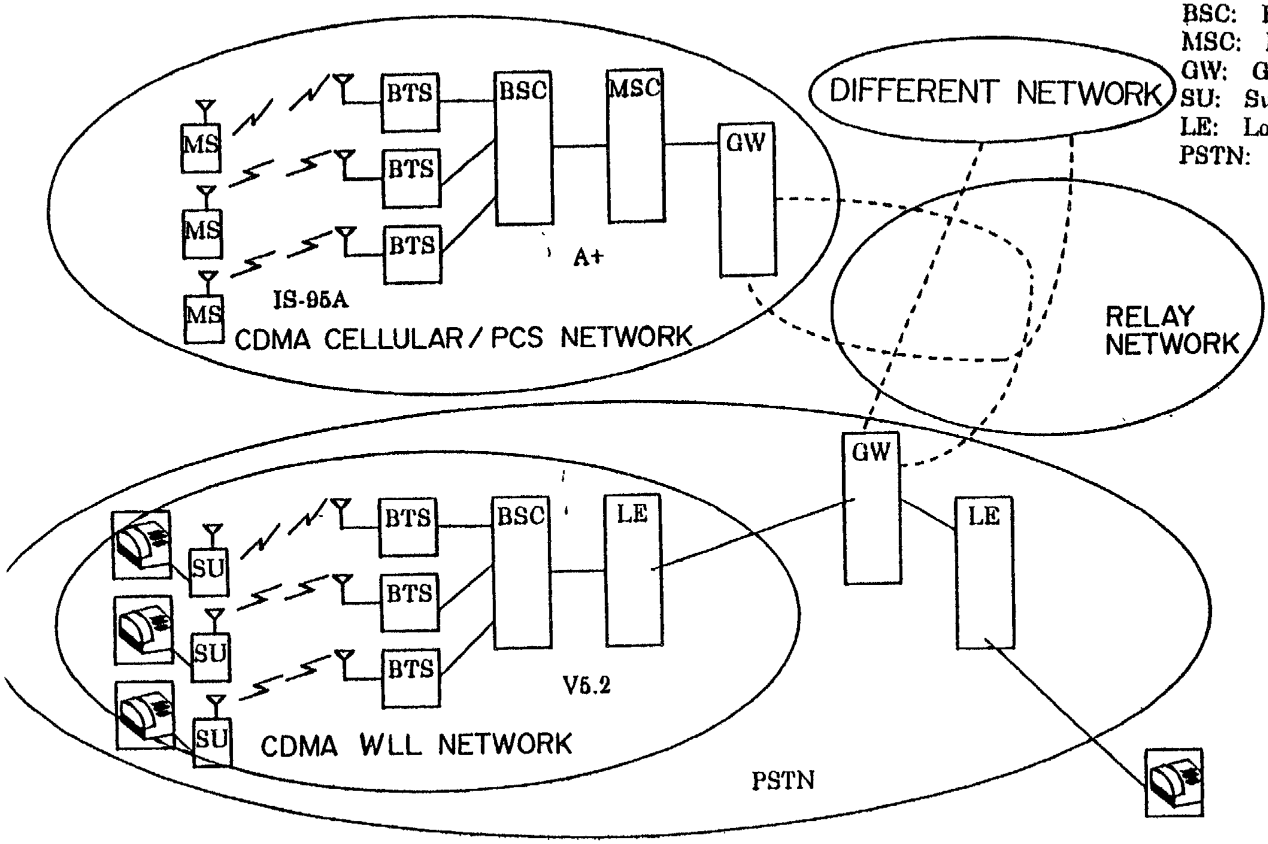


MS: Mobile Station
BTS: Base Station Tranceiver Subsystem
BSC: Base Station Controller
MSC: Mobile Switching Center
GW: Gateway Exchange
SU: Subscriber Unit
LE: Local Exchange
PSTN: Public Switched Telephone Network

FIG. 1 PRIOR ART

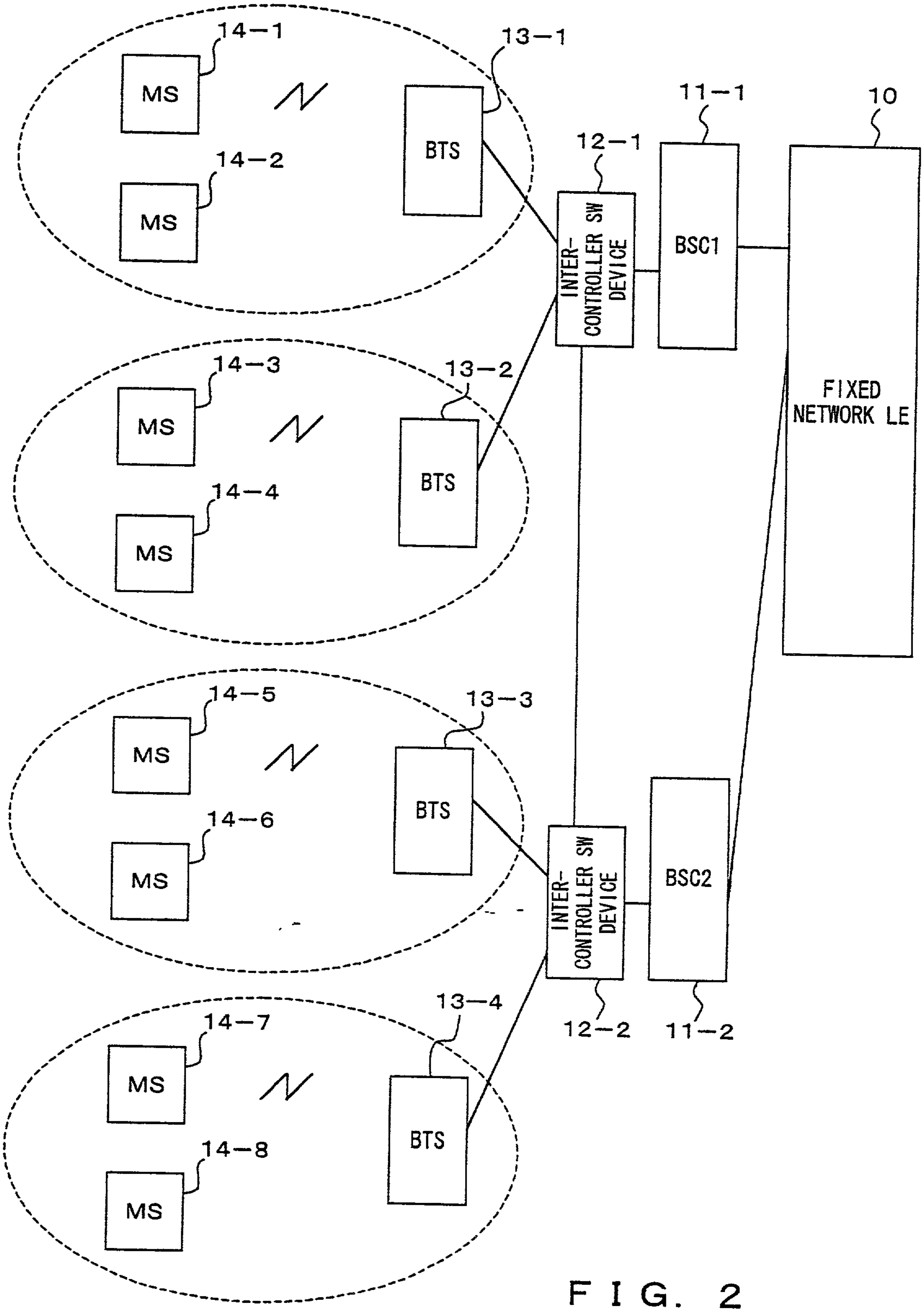
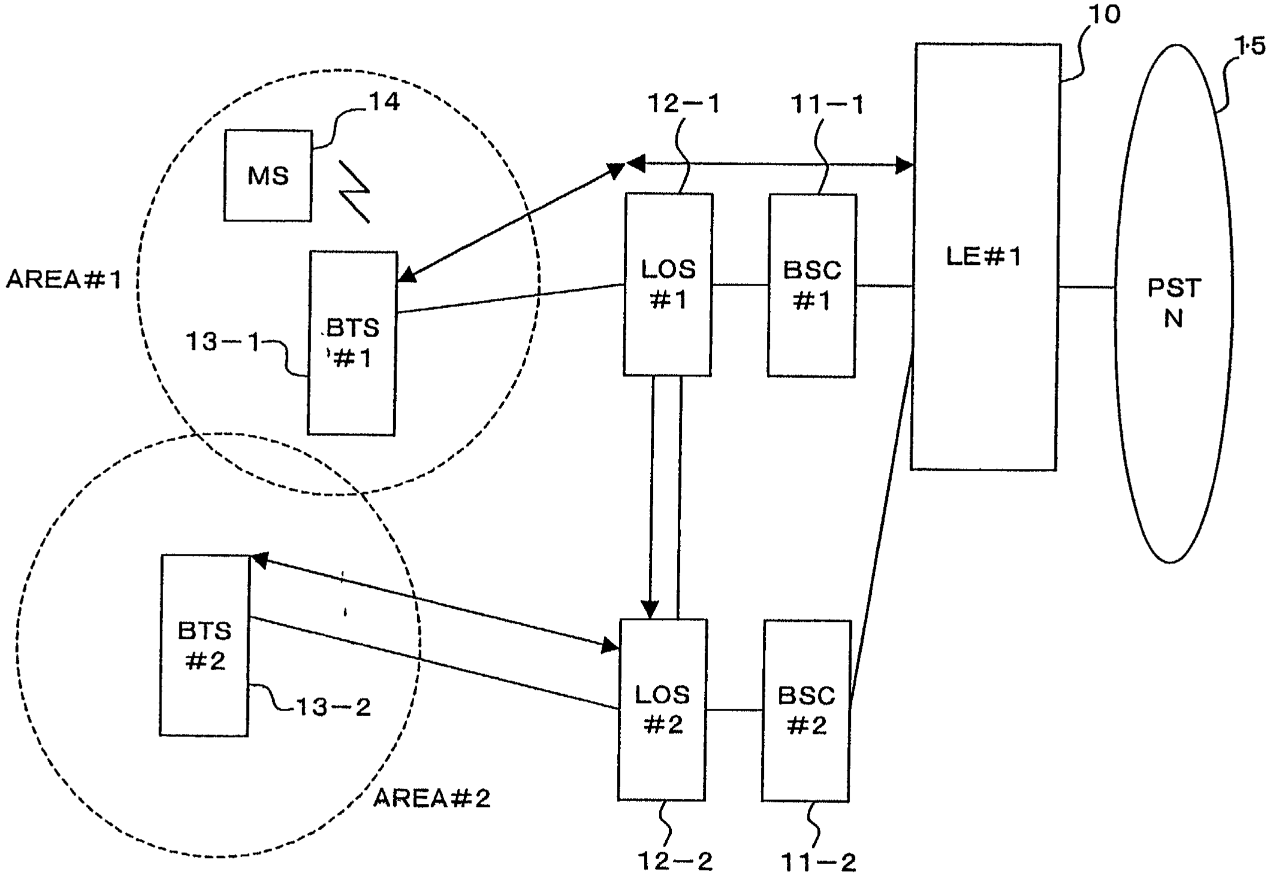
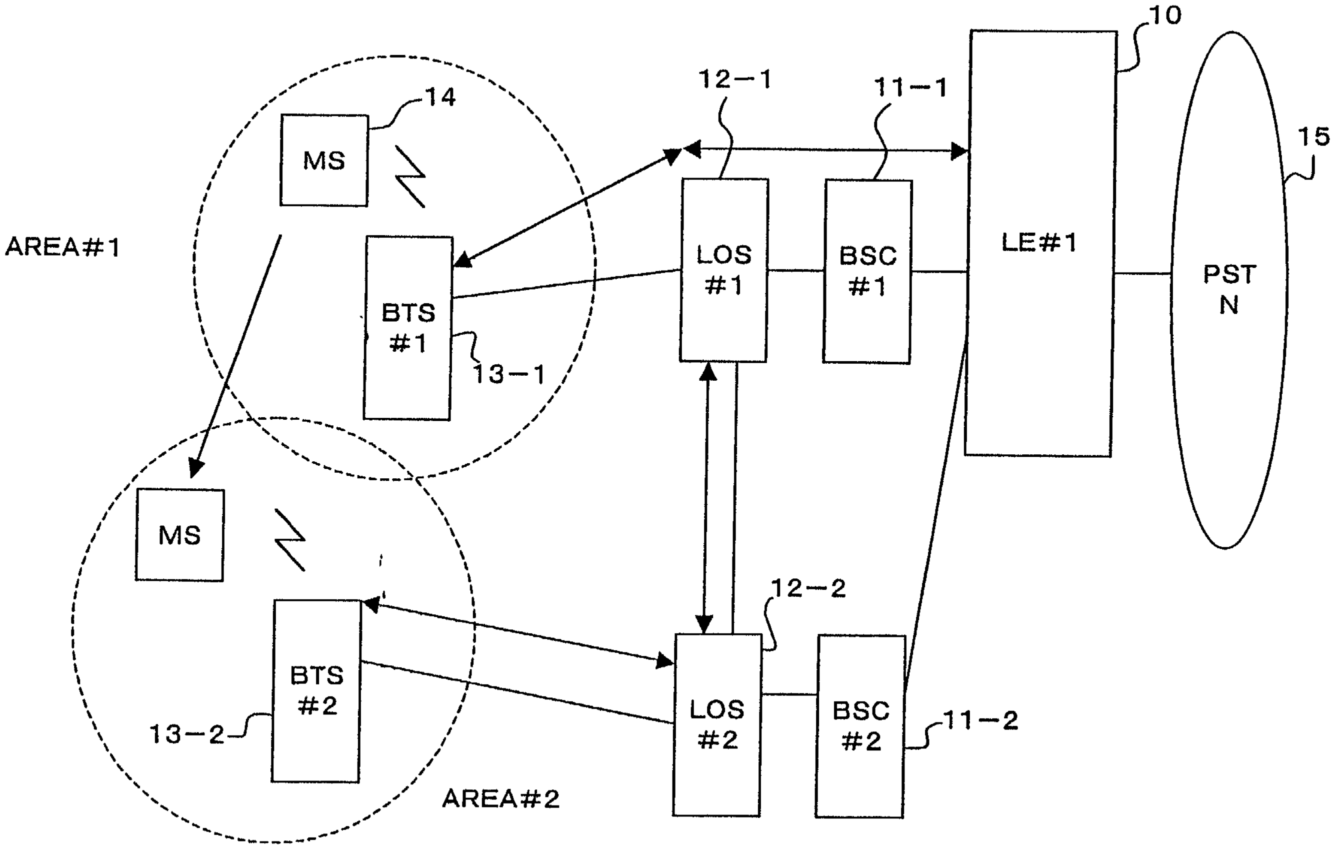

MS
14−1
MS
14−2
BTS
13−1
MS
14−3
MS
14−4
BTS
13−2
MS
14−5
MS
14−6
BTS
13−3
MS
14−7
MS
14−8
BTS
13−4
INTER-CONTROLLER SW DEVICE
12−1
INTER-CONTROLLER SW DEVICE
12−2
BSC1
11−1
BSC2
11−2
FIXED NETWORK LE
10

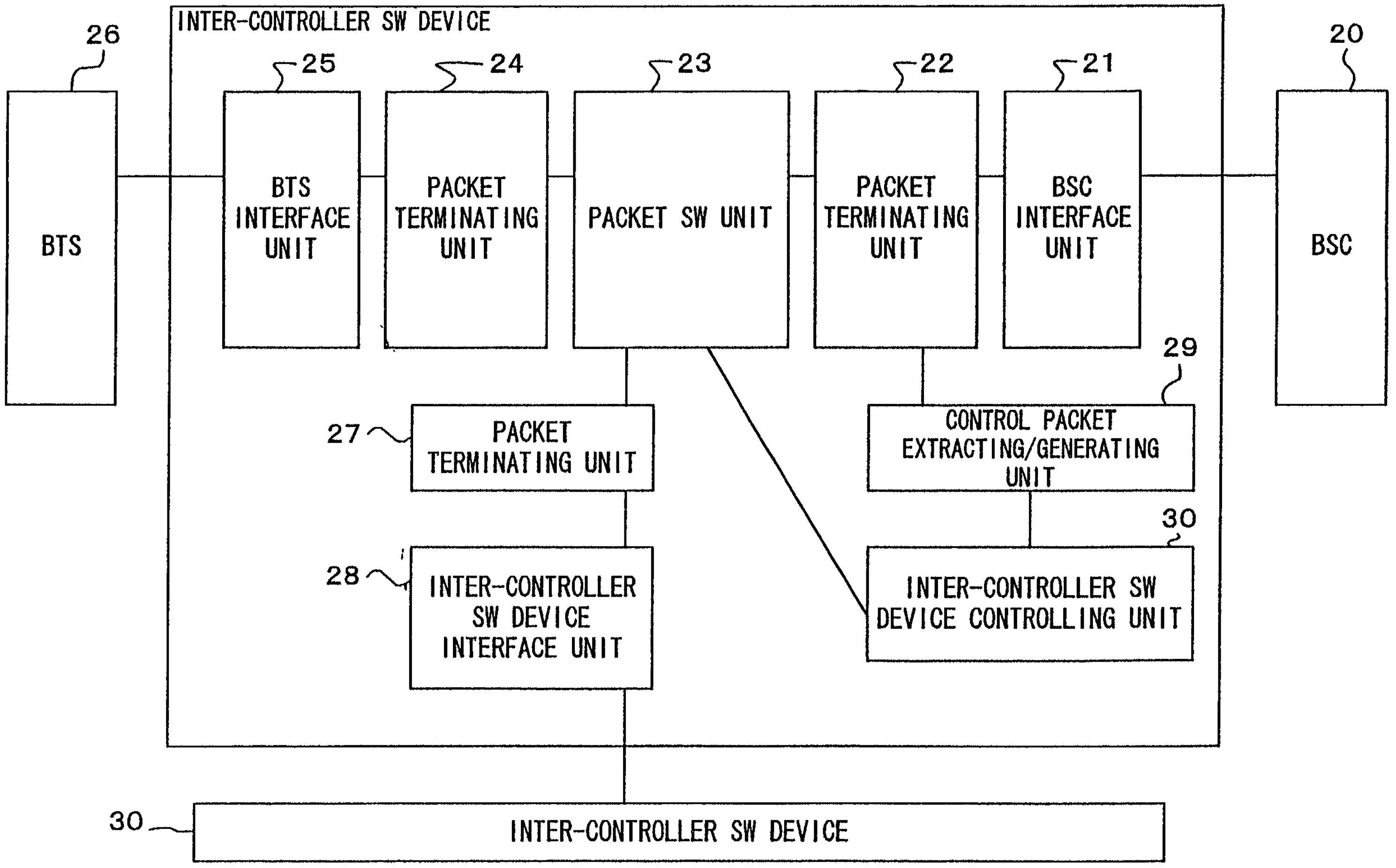
FIG. 2


10
15
12−1
11−1
14
MS
AREA#1
BTS
#1
13−1
LOS
#1
BSC
#1
LE#1
PST
N
BTS
#2
13−2
AREA#2
LOS
#2
BSC
#2
12−2
11−2

F I G. 3

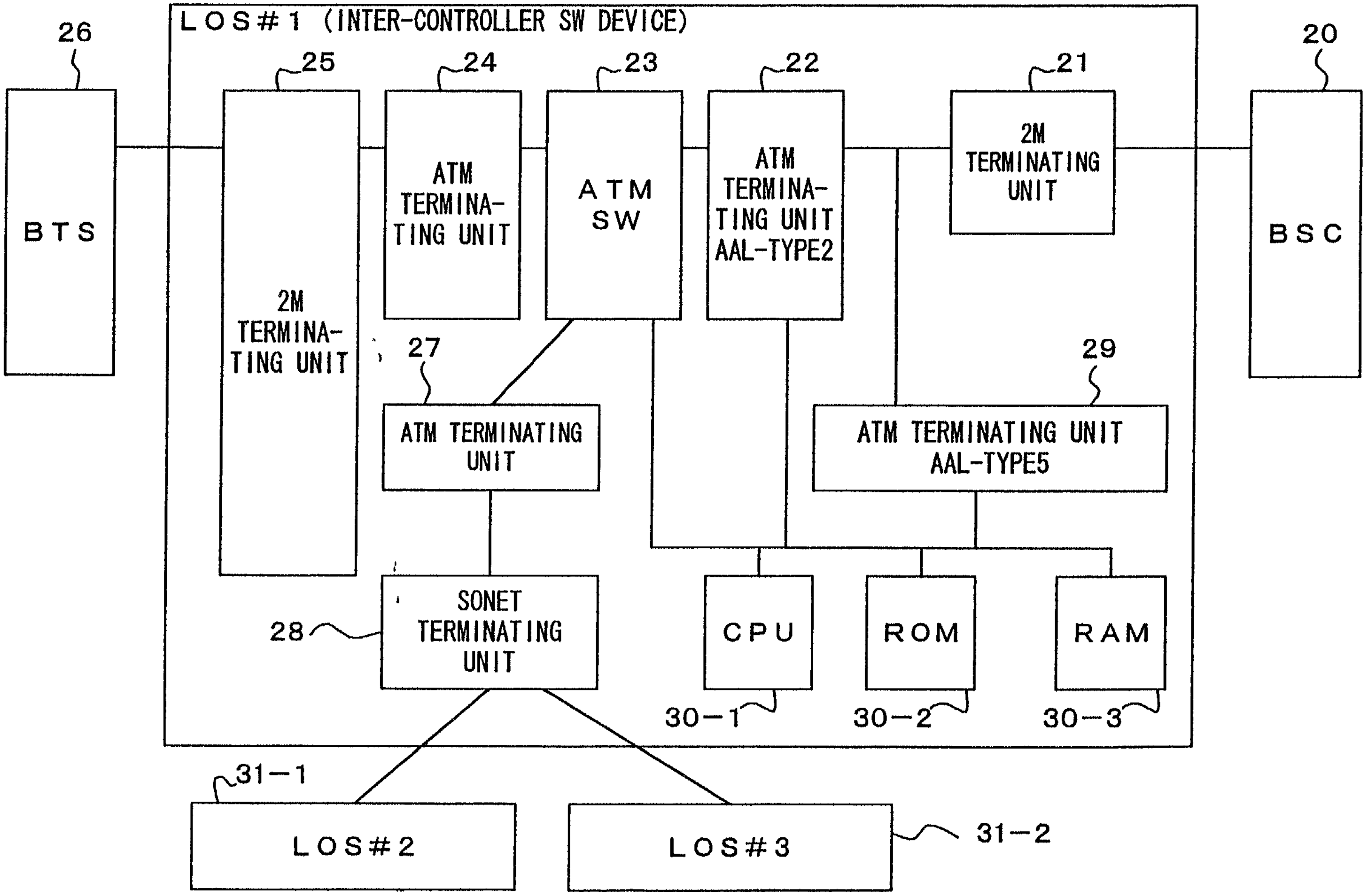

10
15
PST
N
LE#1
12−1
11−1
LOS
#1
BSC
#1
14
MS
AREA#1
BTS
#1
13−1
MS
BTS
#2
13−2
AREA#2
12−2
LOS
#2
BSC
#2
11−2

F I G. 4



INTER-CONTROLLER SW DEVICE
26
BTS
25
BTS INTERFACE UNIT
24
PACKET TERMINATING UNIT
23
PACKET SW UNIT
22
PACKET TERMINATING UNIT
21
BSC INTERFACE UNIT
20
BSC
27
PACKET TERMINATING UNIT
28
INTER-CONTROLLER SW DEVICE INTERFACE UNIT
29
CONTROL PACKET EXTRACTING/GENERATING UNIT
30
INTER-CONTROLLER SW DEVICE CONTROLLING UNIT
30
INTER-CONTROLLER SW DEVICE

F I G. 5



LOS#1 (INTER-CONTROLLER SW DEVICE)
26
BTS
25
2M TERMINA-TING UNIT
24
ATM TERMINA-TING UNIT
23
ATM SW
22
ATM TERMINA-TING UNIT AAL-TYPE2
21
2M TERMINATING UNIT
20
BSC
27
ATM TERMINATING UNIT
29
ATM TERMINATING UNIT AAL-TYPE5
28
SONET TERMINATING UNIT
CPU
ROM
RAM
30-1
30-2
30-3
31-1
LOS#2
LOS#3
31-2

FIG. 6

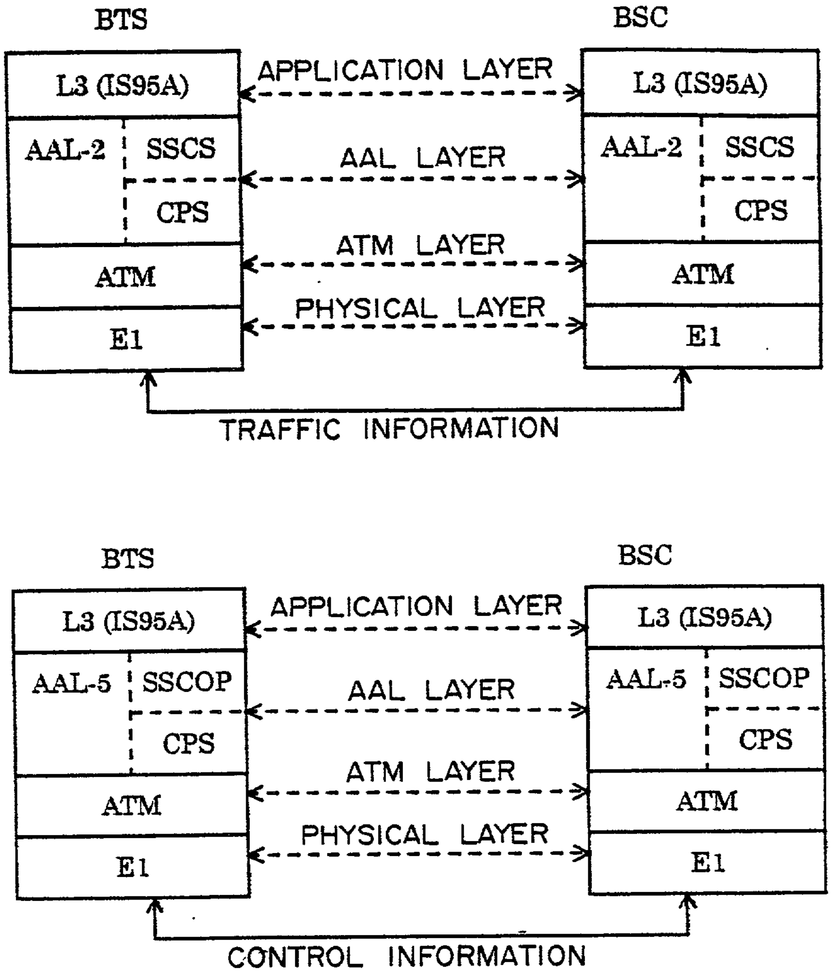

BTS
BSC
L3 (IS95A)
APPLICATION LAYER
L3 (IS95A)
AAL-2
SSCS
AAL LAYER
AAL-2
SSCS
CPS
CPS
ATM LAYER
ATM
ATM
PHYSICAL LAYER
E1
E1
TRAFFIC INFORMATION
BTS
BSC
L3 (IS95A)
APPLICATION LAYER
L3 (IS95A)
AAL-5
SSCOP
AAL LAYER
AAL-5
SSCOP
CPS
CPS
ATM LAYER
ATM
ATM
PHYSICAL LAYER
E1
E1
CONTROL INFORMATION

FIG. 7

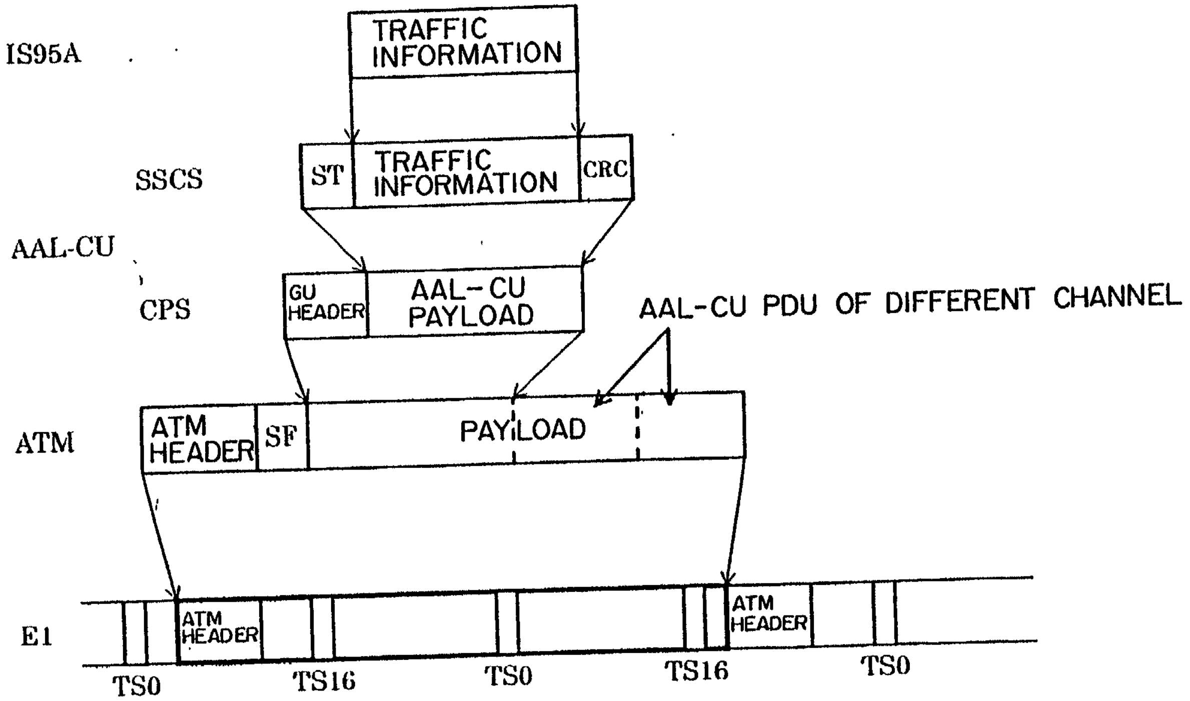

IS95A
TRAFFIC INFORMATION
SSCS
ST
TRAFFIC INFORMATION
CRC
AAL-CU
CPS
GU HEADER
AAL-CU PAYLOAD
AAL-CU PDU OF DIFFERENT CHANNEL
ATM
ATM HEADER
SF
PAYLOAD
E1
ATM HEADER
ATM HEADER
TS0
TS16
TS0
TS16
TS0

FIG. 8

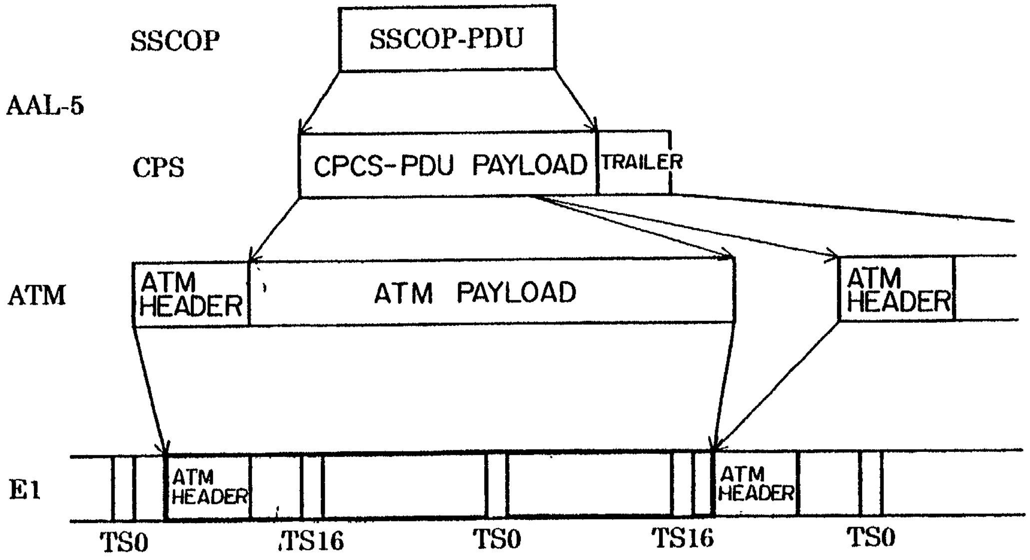

SSCOP
AAL-5
CPS
ATM
E1
SSCOP-PDU
CPCS-PDU PAYLOAD
TRAILER
ATM HEADER
ATM PAYLOAD
ATM HEADER
ATM HEADER
ATM HEADER
TS0
TS16
TS0
TS16
TS0

FIG. 9

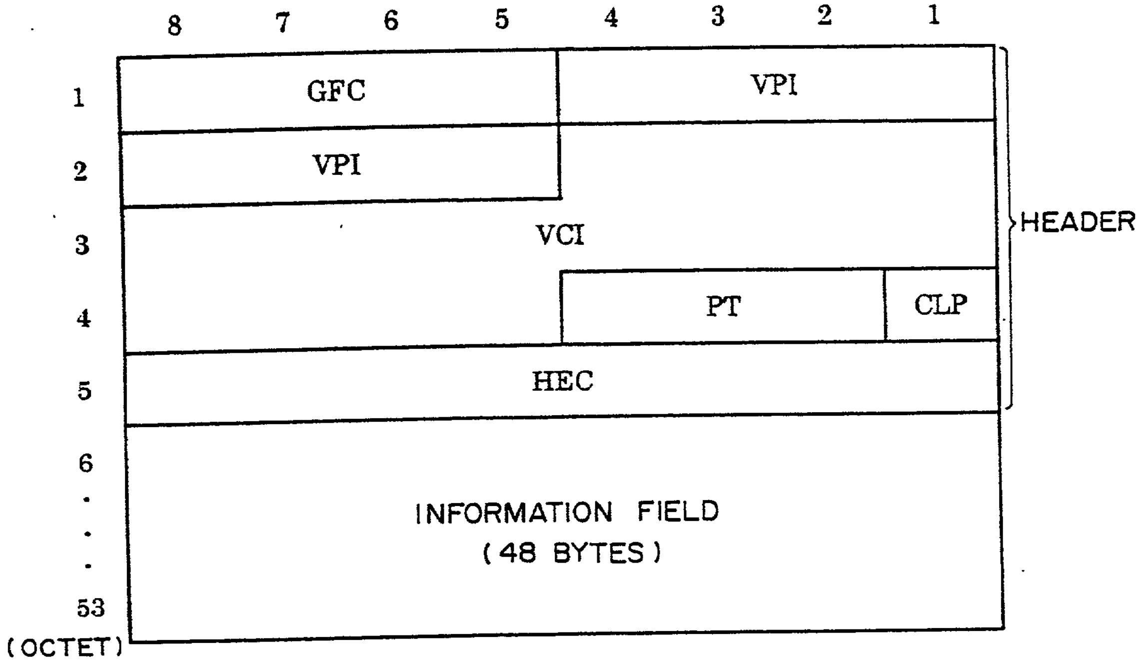

8
7
6
5
4
3
2
1
1
2
3
4
5
6
53
(OCTET)
GFC
VPI
VPI
VCI
PT
CLP
HEC
HEADER
INFORMATION FIELD
(48 BYTES)

FIG. 10

FIELD NAME	CONTENTS
GFC (Generic Flow Control)	FIELD FOR NETWORK TRAFFIC CONTROL IN UNI. SPECIFIC CONTROL IS NOW UNDER STUDY. "0000" IS SET IN THIS SYSTEM.
VCI/VPI (Virtual Patch Identifier /Virtual Channel Identifier)	FIELD FOR SETTING ROUTING INFORMATION OF ATM CELL. TRANSFER PATH IS DETERMINED BY COMBINING VPI AND VCI.
PT (Payload Type)	FIELD FOR INDICATING WHETHER INFORMATION FIELD OF ATM CELL IS EITHER USER OR CONTROL INFORMATION. ALSO USED FOR CONGESTION CONTROL OR ATM LAYER USER DISPLAY.
CLP (Cell Loss Priority)	SET TO "1" FOR CELL WHICH MAY BE PREFERENTIALLY DISCARDED WHEN NETWORK BECOMES CONGESTED. OTHERWISE, SET TO "0". FIXED TO "0" IN THIS SYSTEM.
HEC (Header Error Control)	FIELD FOR SETTING CRC CODE FOR DETECTING ERROR IN ATM HEADER GENERATING POLYNOMIAL IS x^3+x^2+x+1

FIG. 11

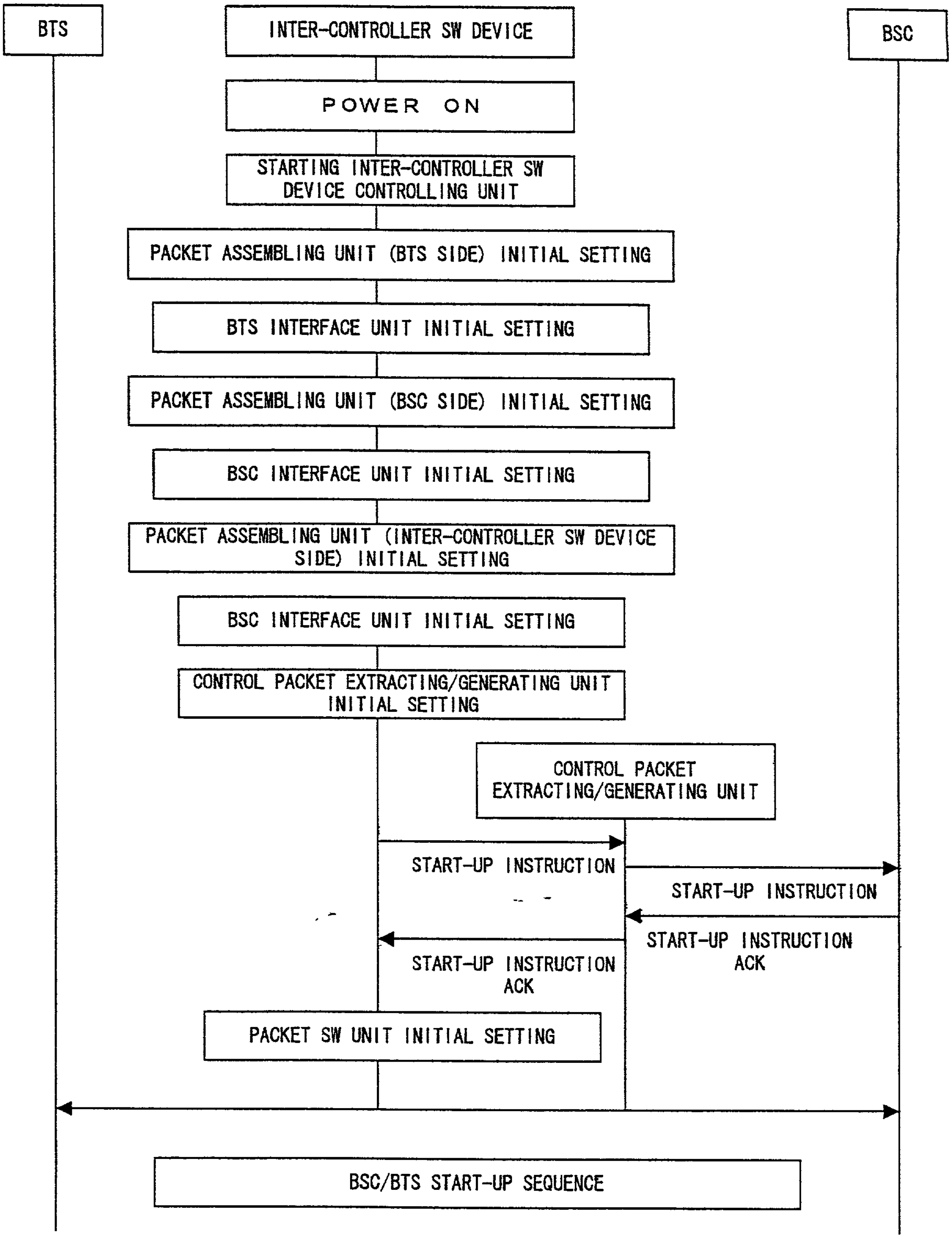
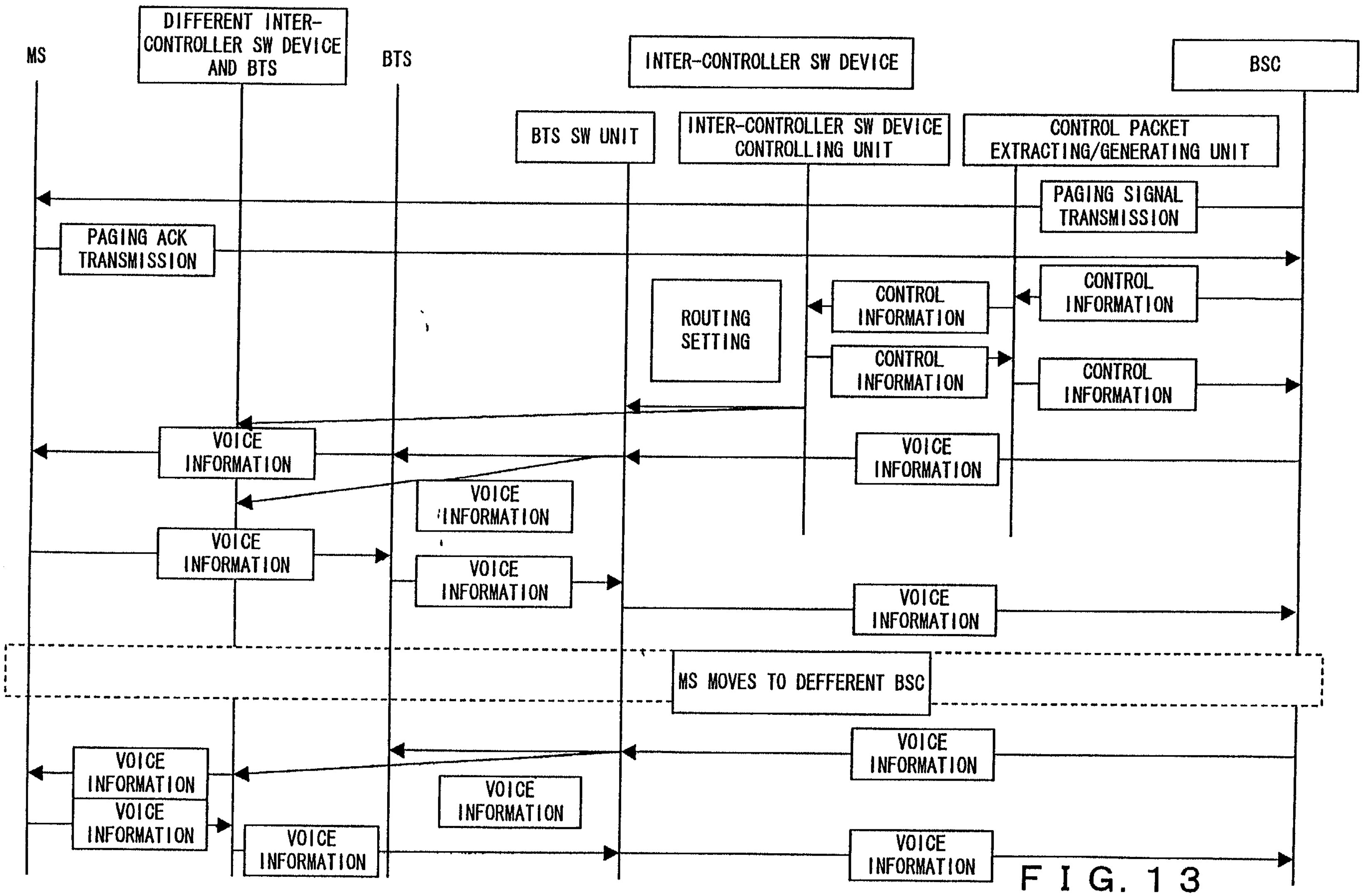
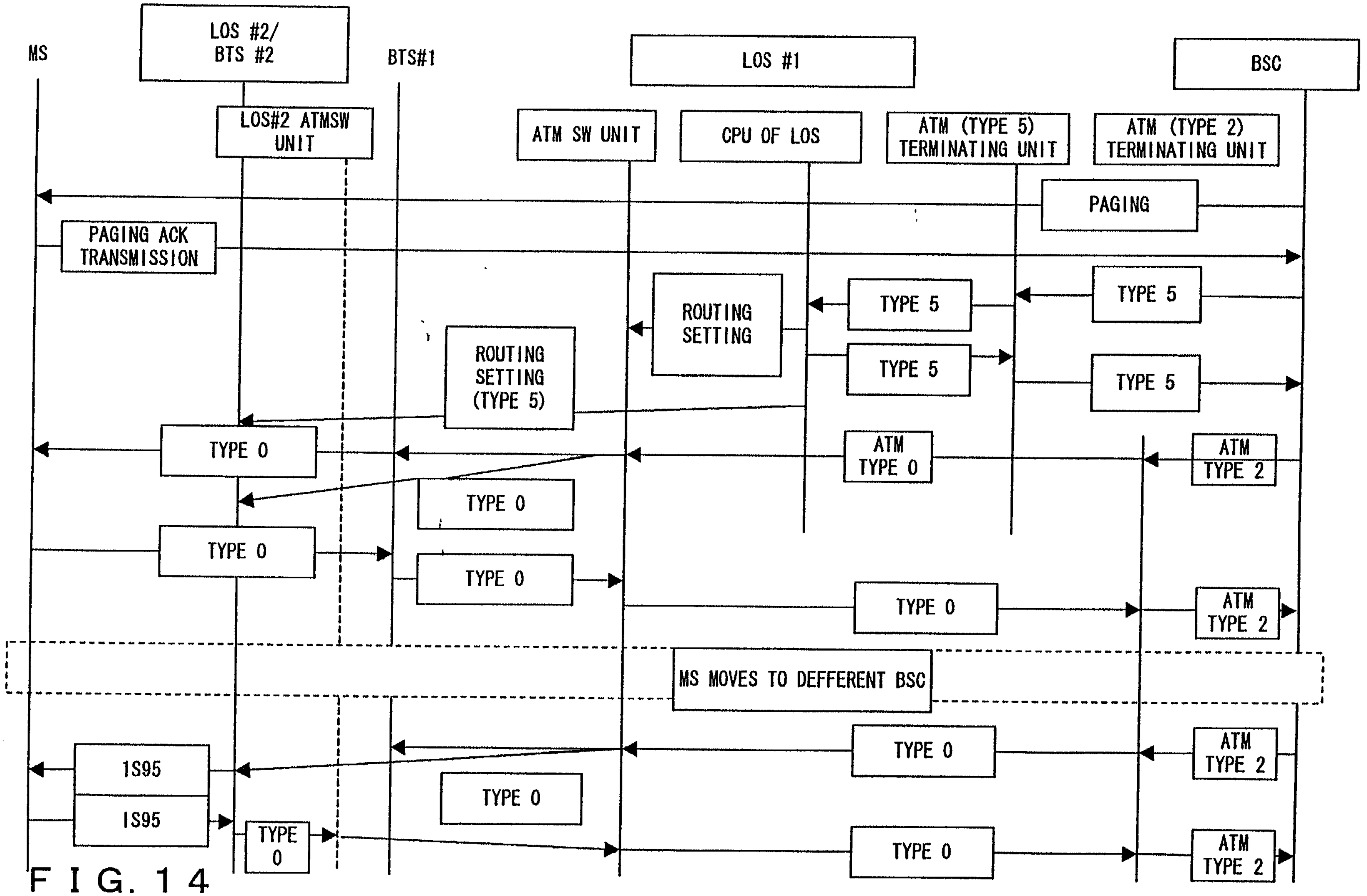

BTS
INTER-CONTROLLER SW DEVICE
BSC
POWER ON
STARTING INTER-CONTROLLER SW DEVICE CONTROLLING UNIT
PACKET ASSEMBLING UNIT (BTS SIDE) INITIAL SETTING
BTS INTERFACE UNIT INITIAL SETTING
PACKET ASSEMBLING UNIT (BSC SIDE) INITIAL SETTING
BSC INTERFACE UNIT INITIAL SETTING
PACKET ASSEMBLING UNIT (INTER-CONTROLLER SW DEVICE SIDE) INITIAL SETTING
BSC INTERFACE UNIT INITIAL SETTING
CONTROL PACKET EXTRACTING/GENERATING UNIT INITIAL SETTING
CONTROL PACKET EXTRACTING/GENERATING UNIT
START-UP INSTRUCTION
START-UP INSTRUCTION
START-UP INSTRUCTION ACK
START-UP INSTRUCTION ACK
PACKET SW UNIT INITIAL SETTING
BSC/BTS START-UP SEQUENCE

FIG. 12


MS
DIFFERENT INTER-CONTROLLER SW DEVICE AND BTS
BTS
INTER-CONTROLLER SW DEVICE
BSC
BTS SW UNIT
INTER-CONTROLLER SW DEVICE CONTROLLING UNIT
CONTROL PACKET EXTRACTING/GENERATING UNIT
PAGING SIGNAL TRANSMISSION
PAGING ACK TRANSMISSION
CONTROL INFORMATION
CONTROL INFORMATION
ROUTING SETTING
CONTROL INFORMATION
CONTROL INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
MS MOVES TO DEFFERENT BSC
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION

F I G. 1 3


MS
LOS #2/
BTS #2
BTS#1
LOS #1
BSC
LOS#2 ATMSW UNIT
ATM SW UNIT
CPU OF LOS
ATM (TYPE 5) TERMINATING UNIT
ATM (TYPE 2) TERMINATING UNIT
PAGING
PAGING ACK TRANSMISSION
TYPE 5
ROUTING SETTING
TYPE 5
TYPE 5
TYPE 5
ROUTING SETTING (TYPE 5)
TYPE 0
ATM TYPE 0
ATM TYPE 2
TYPE 0
TYPE 0
TYPE 0
TYPE 0
ATM TYPE 2
MS MOVES TO DEFFERENT BSC
TYPE 0
ATM TYPE 2
1S95
1S95
TYPE 0
TYPE 0
TYPE 0
ATM TYPE 2

F I G. 1 4

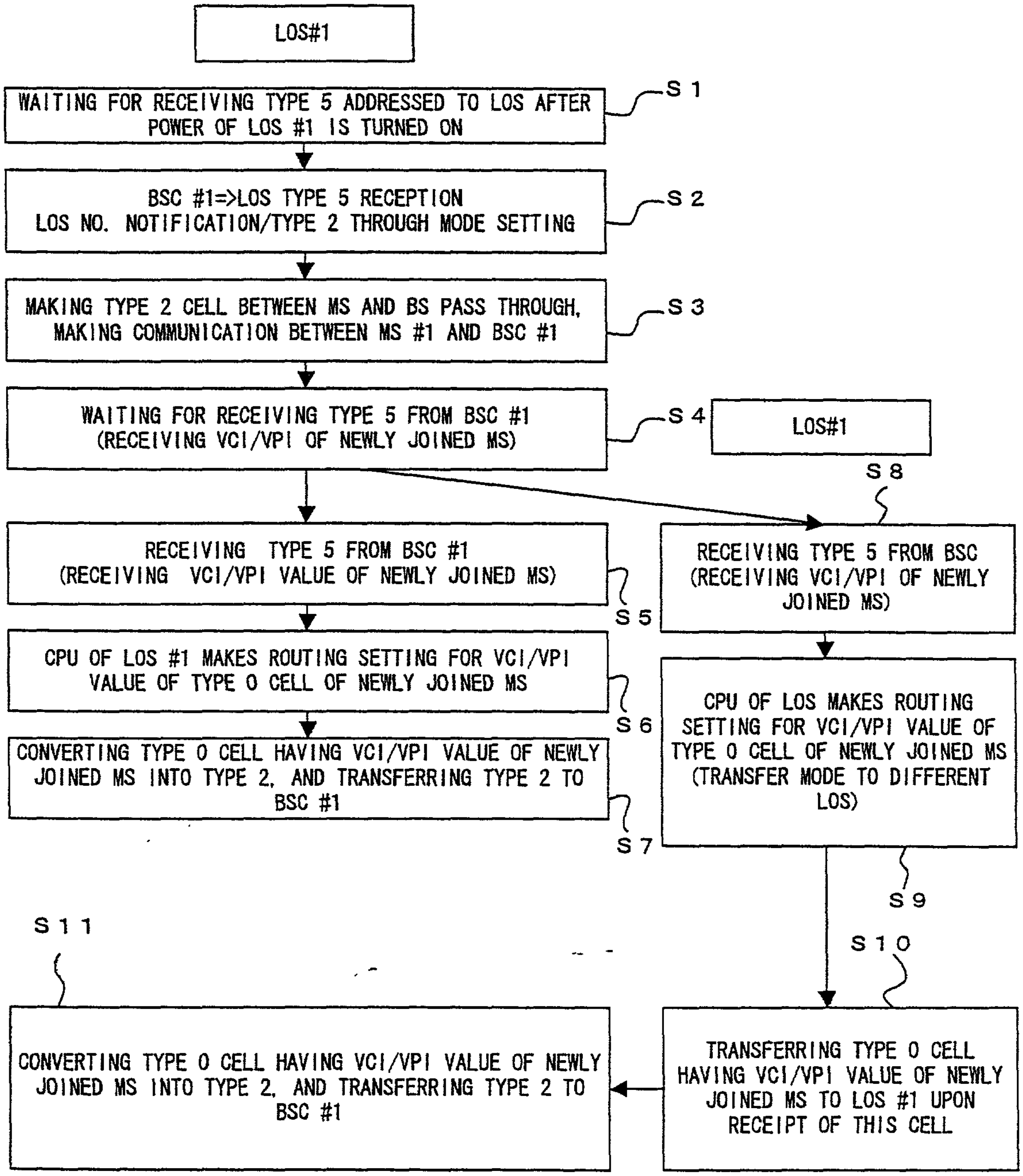

LOS#1
WAITING FOR RECEIVING TYPE 5 ADDRESSED TO LOS AFTER POWER OF LOS #1 IS TURNED ON
S1
BSC #1=>LOS TYPE 5 RECEPTION
LOS NO. NOTIFICATION/TYPE 2 THROUGH MODE SETTING
S2
MAKING TYPE 2 CELL BETWEEN MS AND BS PASS THROUGH, MAKING COMMUNICATION BETWEEN MS #1 AND BSC #1
S3
WAITING FOR RECEIVING TYPE 5 FROM BSC #1 (RECEIVING VCI/VPI OF NEWLY JOINED MS)
S4
LOS#1
S8
RECEIVING TYPE 5 FROM BSC #1 (RECEIVING VCI/VPI VALUE OF NEWLY JOINED MS)
S5
RECEIVING TYPE 5 FROM BSC (RECEIVING VCI/VPI OF NEWLY JOINED MS)
CPU OF LOS #1 MAKES ROUTING SETTING FOR VCI/VPI VALUE OF TYPE 0 CELL OF NEWLY JOINED MS
S6
CPU OF LOS MAKES ROUTING SETTING FOR VCI/VPI VALUE OF TYPE 0 CELL OF NEWLY JOINED MS (TRANSFER MODE TO DIFFERENT LOS)
CONVERTING TYPE 0 CELL HAVING VCI/VPI VALUE OF NEWLY JOINED MS INTO TYPE 2, AND TRANSFERRING TYPE 2 TO BSC #1
S7
S9
S11
S10
CONVERTING TYPE 0 CELL HAVING VCI/VPI VALUE OF NEWLY JOINED MS INTO TYPE 2, AND TRANSFERRING TYPE 2 TO BSC #1
TRANSFERRING TYPE 0 CELL HAVING VCI/VPI VALUE OF NEWLY JOINED MS TO LOS #1 UPON RECEIPT OF THIS CELL

FIG. 15

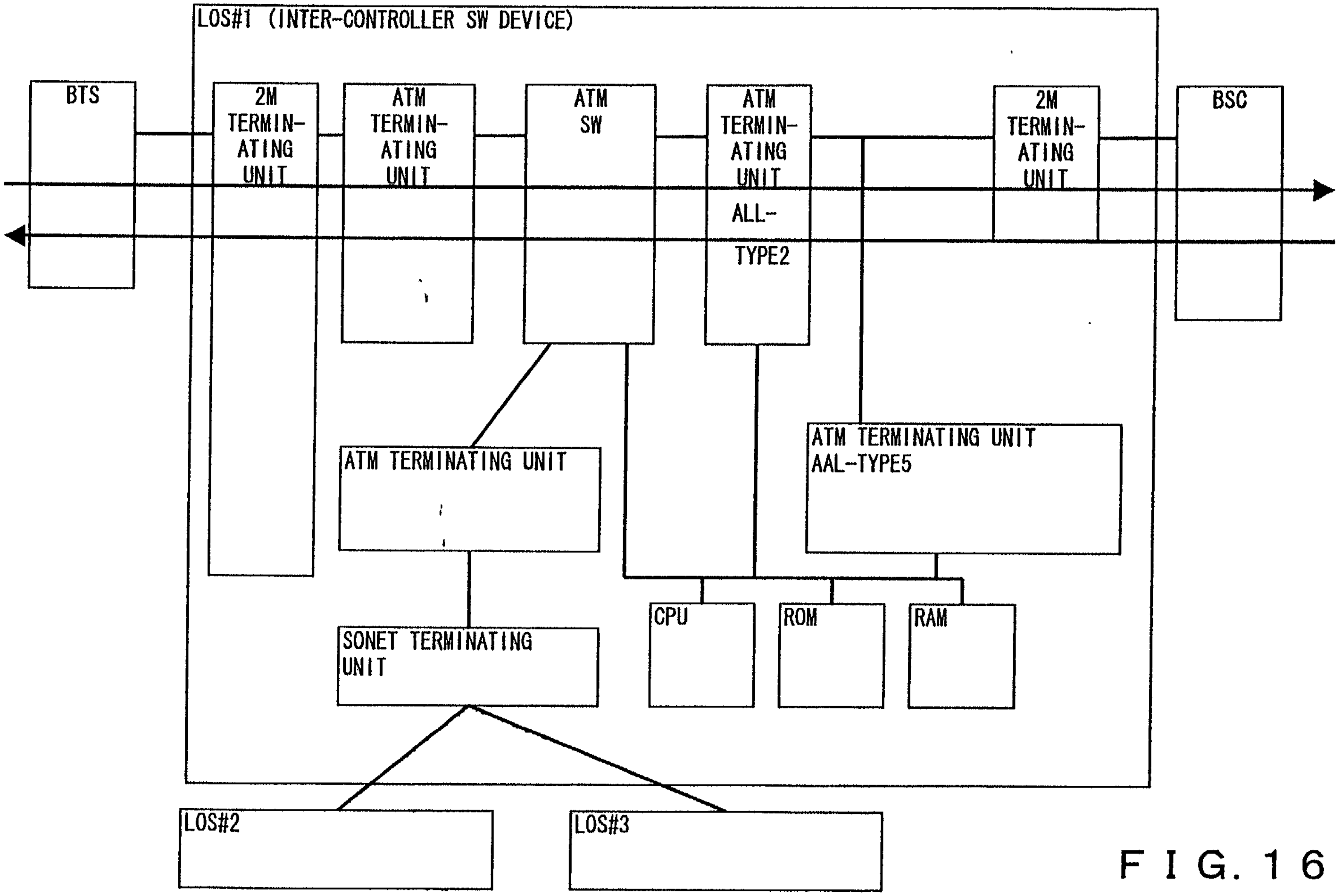

LOS#1 (INTER-CONTROLLER SW DEVICE)
BTS
2M TERMIN-ATING UNIT
ATM TERMIN-ATING UNIT
ATM SW
ATM TERMIN-ATING UNIT
ALL-TYPE2
2M TERMIN-ATING UNIT
BSC
ATM TERMINATING UNIT
ATM TERMINATING UNIT AAL-TYPE5
SONET TERMINATING UNIT
CPU
ROM
RAM
LOS#2
LOS#3

FIG. 16

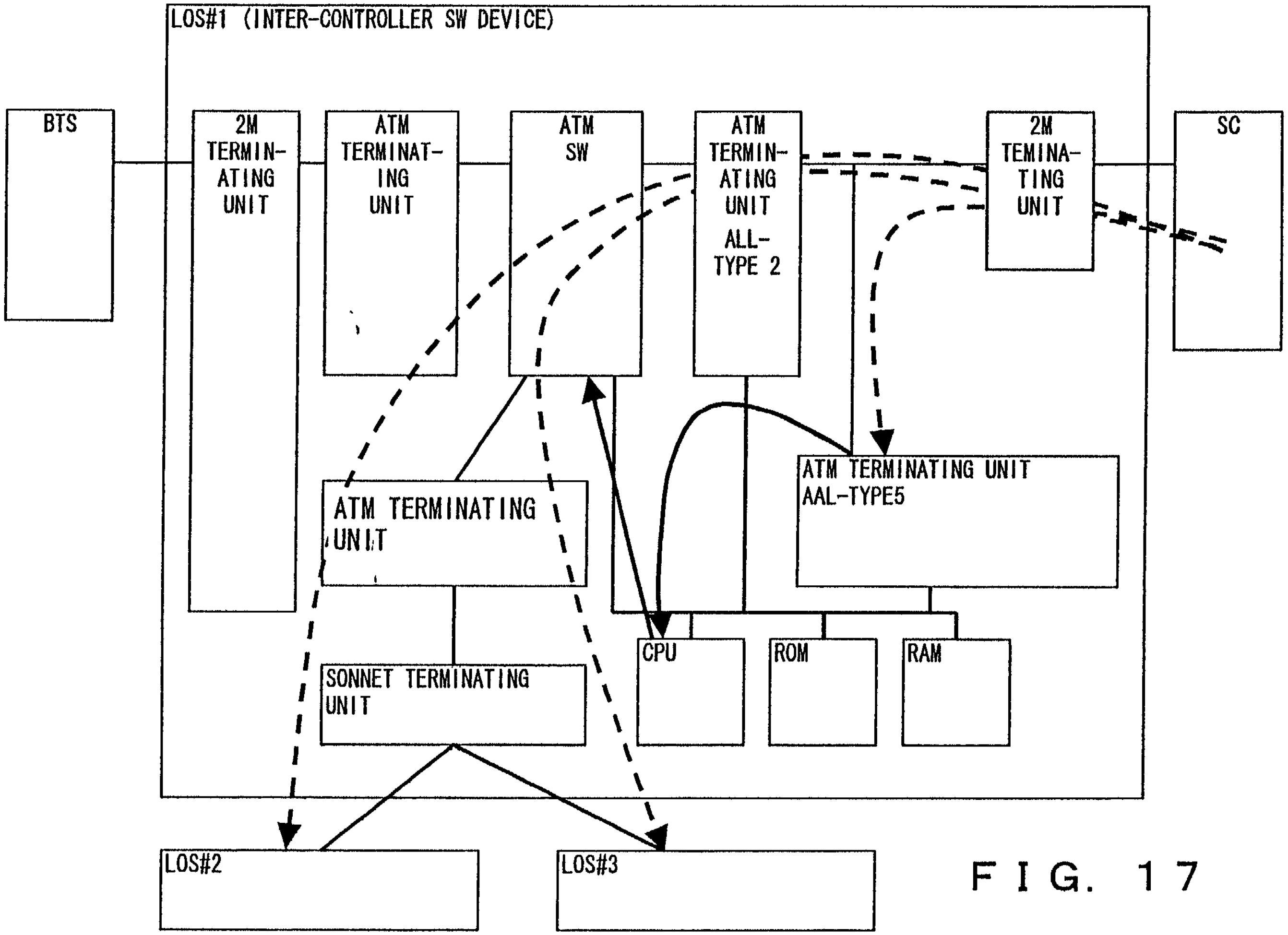

LOS#1 (INTER-CONTROLLER SW DEVICE)
BTS
2M TERMIN-ATING UNIT
ATM TERMINAT-ING UNIT
ATM SW
ATM TERMIN-ATING UNIT ALL-TYPE 2
2M TEMINA-TING UNIT
SC
ATM TERMINATING UNIT
ATM TERMINATING UNIT AAL-TYPE5
SONNET TERMINATING UNIT
CPU
ROM
RAM
LOS#2
LOS#3

FIG. 17

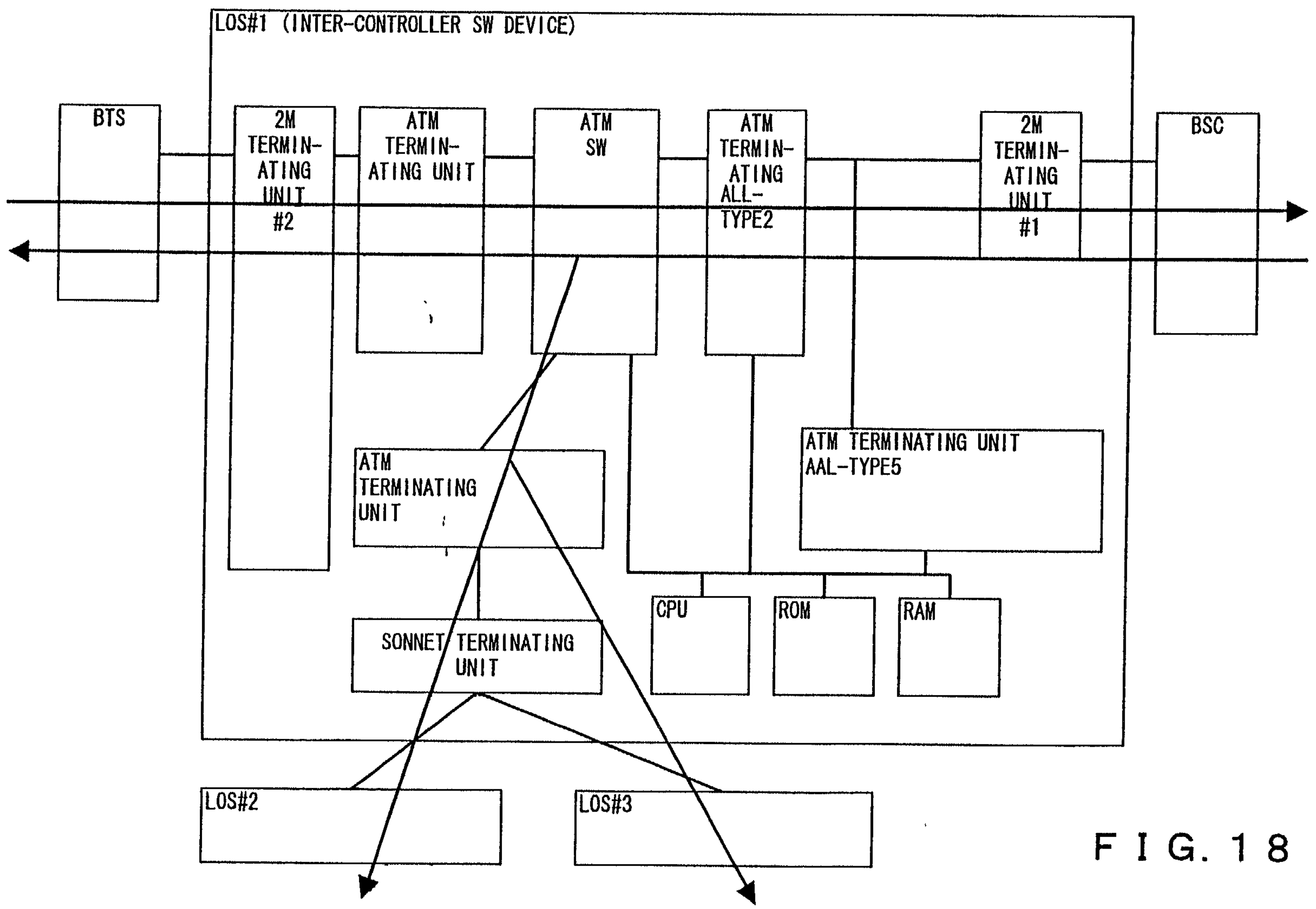

LOS#1 (INTER-CONTROLLER SW DEVICE)
BTS
2M TERMIN-ATING UNIT #2
ATM TERMIN-ATING UNIT
ATM SW
ATM TERMIN-ATING ALL-TYPE2
2M TERMIN-ATING UNIT #1
BSC
ATM TERMINATING UNIT
ATM TERMINATING UNIT AAL-TYPE5
CPU
ROM
RAM
SONNET TERMINATING UNIT
LOS#2
LOS#3

FIG. 18

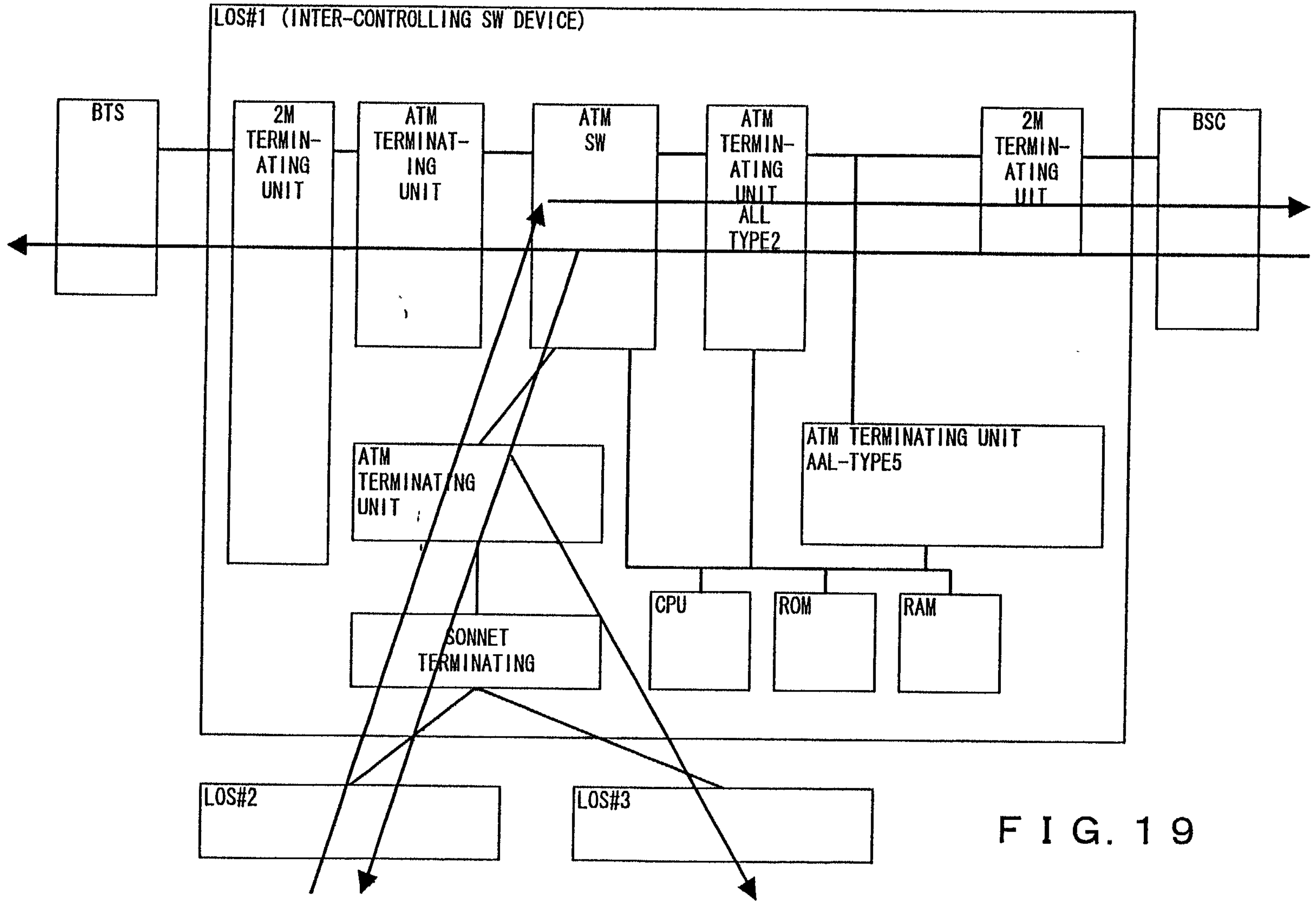

LOS#1 (INTER-CONTROLLING SW DEVICE)
BTS
2M TERMIN-ATING UNIT
ATM TERMINAT-ING UNIT
ATM SW
ATM TERMIN-ATING UNIT ALL TYPE2
2M TERMIN-ATING UIT
BSC
ATM TERMINATING UNIT
ATM TERMINATING UNIT AAL-TYPE5
SONNET TERMINATING
CPU
ROM
RAM
LOS#2
LOS#3

FIG. 19

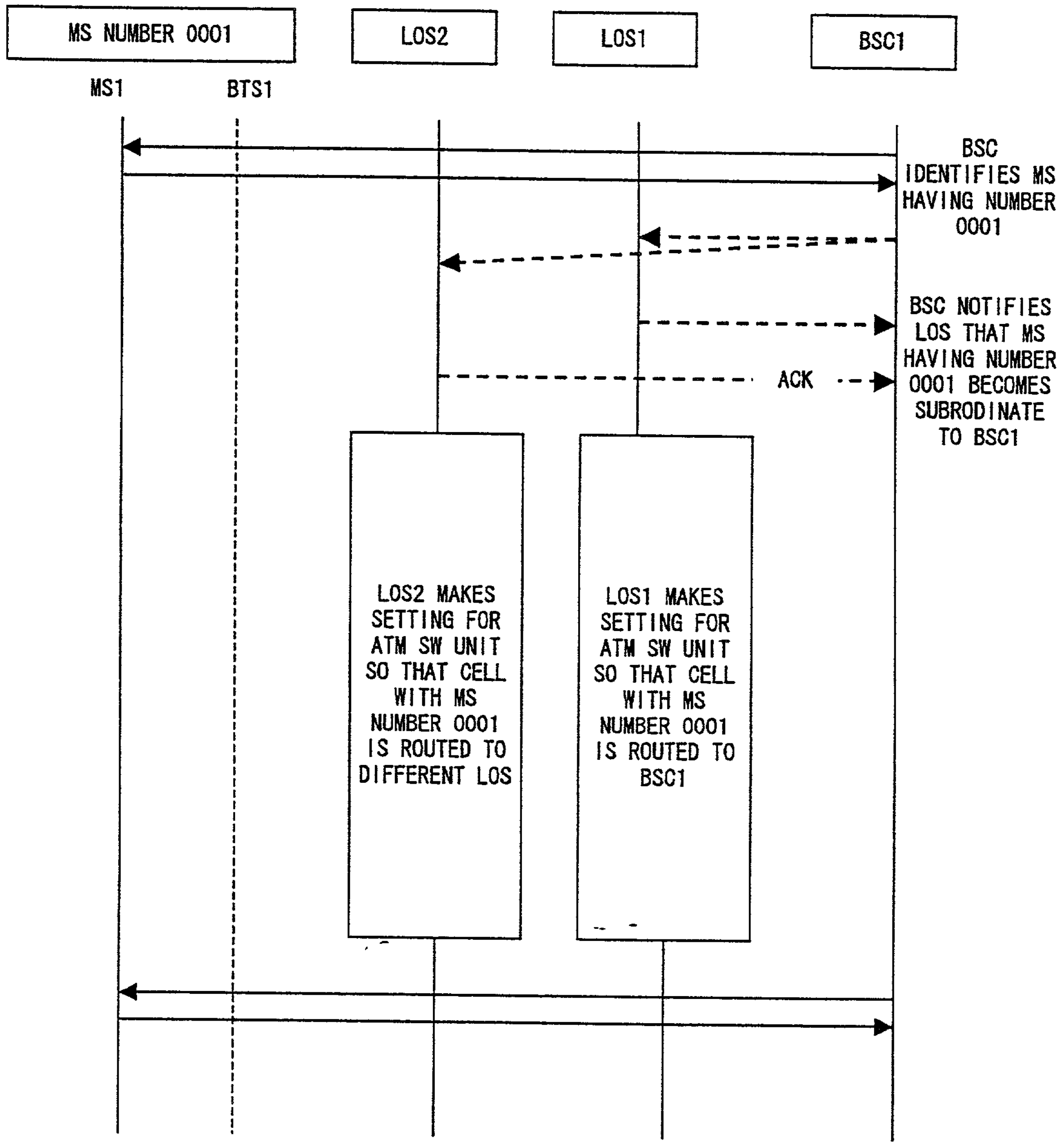
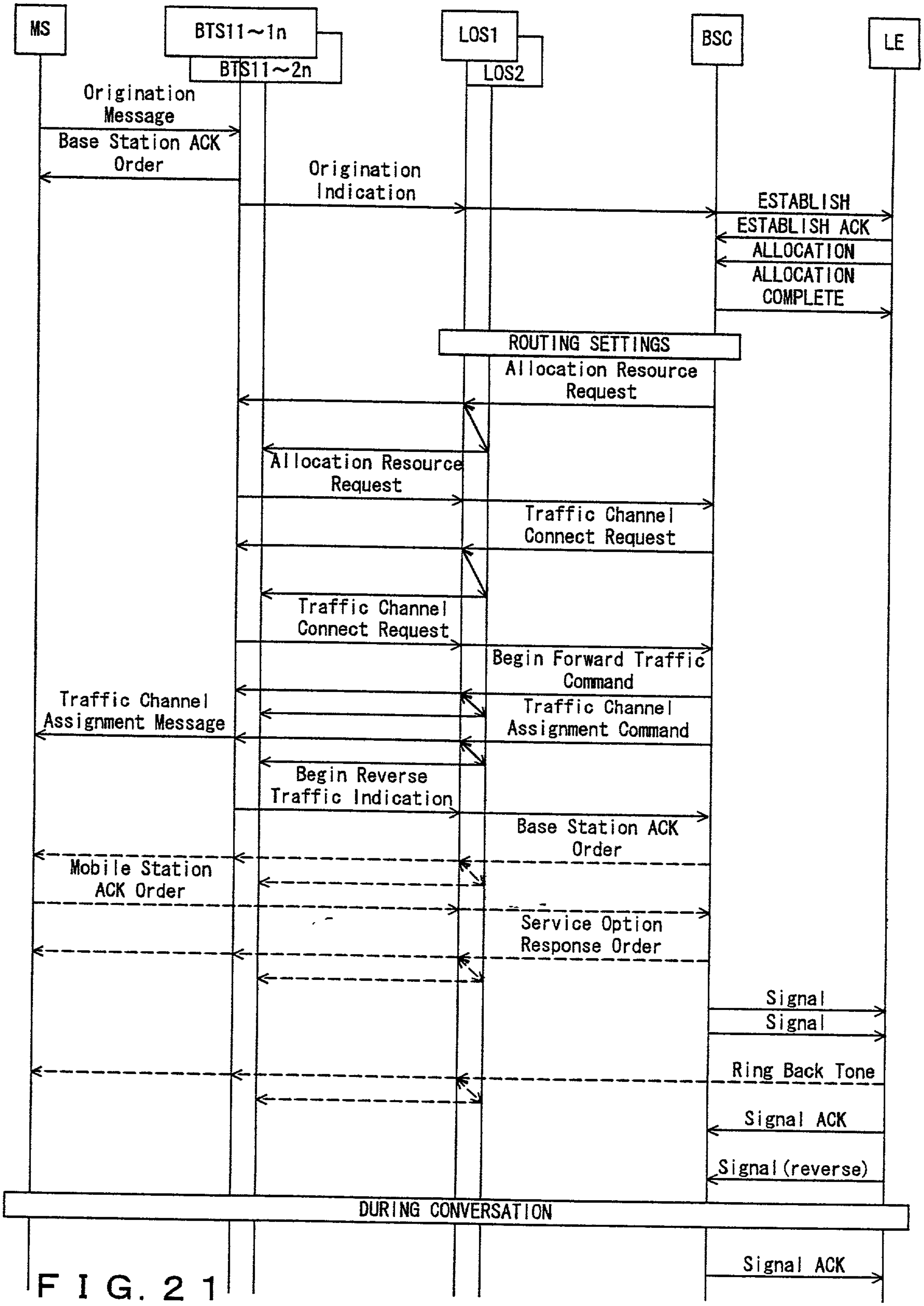
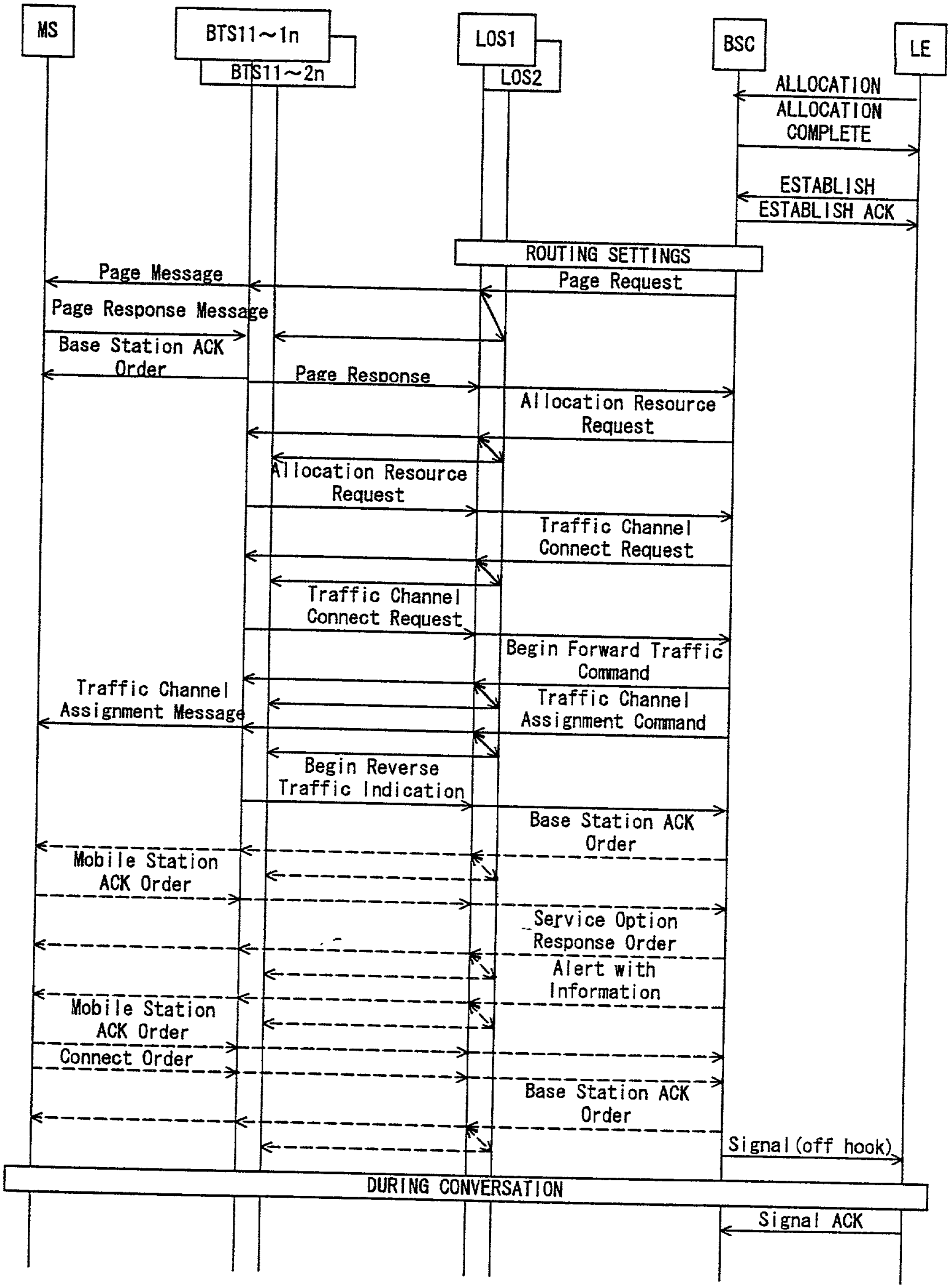

MS NUMBER 0001
LOS2
LOS1
BSC1
MS1
BTS1
BSC IDENTIFIES MS HAVING NUMBER 0001
BSC NOTIFIES LOS THAT MS HAVING NUMBER 0001 BECOMES SUBRODINATE TO BSC1
ACK
LOS2 MAKES SETTING FOR ATM SW UNIT SO THAT CELL WITH MS NUMBER 0001 IS ROUTED TO DIFFERENT LOS
LOS1 MAKES SETTING FOR ATM SW UNIT SO THAT CELL WITH MS NUMBER 0001 IS ROUTED TO BSC1

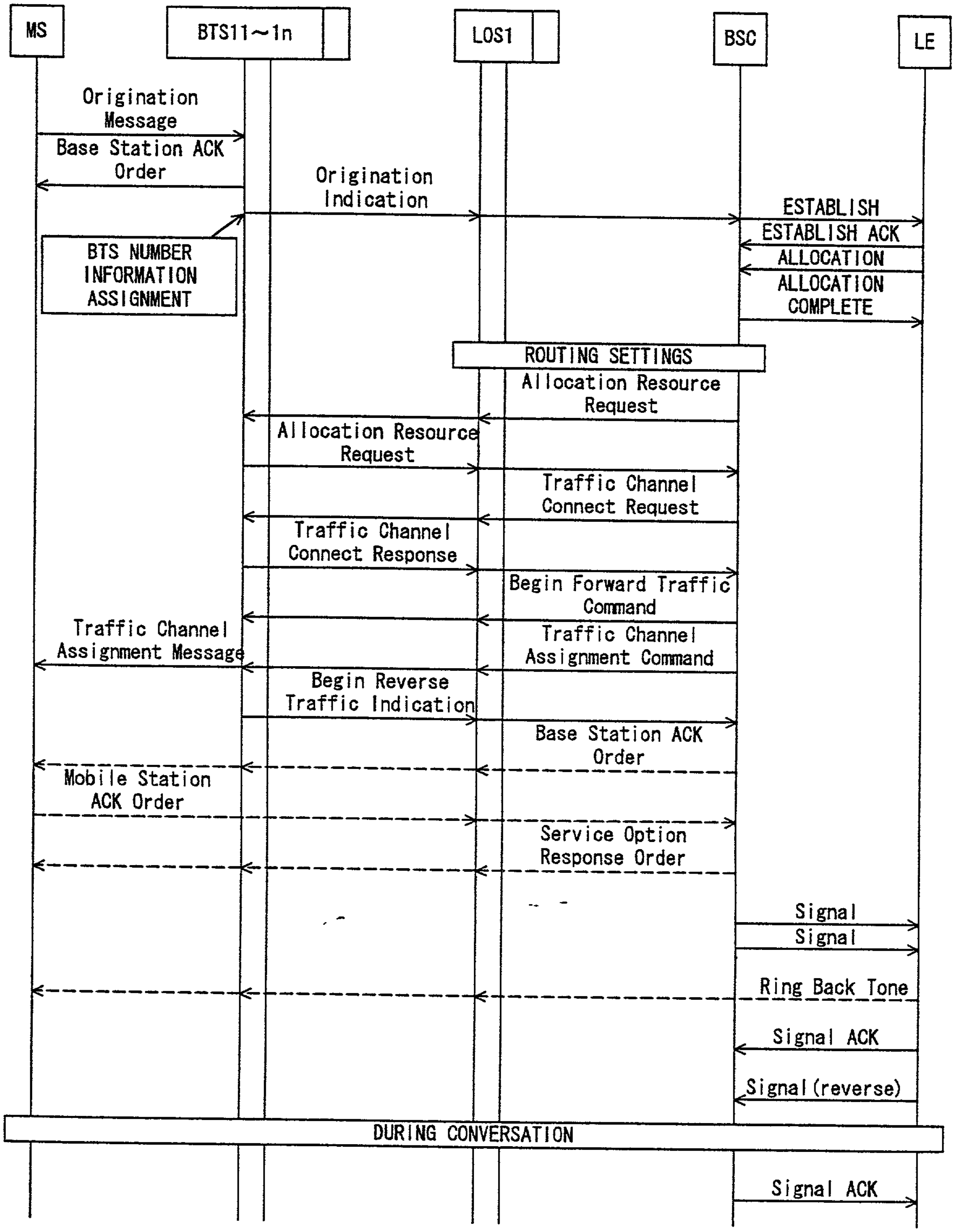
FIG. 20


MS
BTS11～1n
BTS11～2n
LOS1
LOS2
BSC
LE
Origination Message
Base Station ACK Order
Origination Indication
ESTABLISH
ESTABLISH ACK
ALLOCATION
ALLOCATION COMPLETE
ROUTING SETTINGS
Allocation Resource Request
Allocation Resource Request
Traffic Channel Connect Request
Traffic Channel Connect Request
Begin Forward Traffic Command
Traffic Channel Assignment Message
Traffic Channel Assignment Command
Begin Reverse Traffic Indication
Base Station ACK Order
Mobile Station ACK Order
Service Option Response Order
Signal
Signal
Ring Back Tone
Signal ACK
Signal (reverse)
DURING CONVERSATION
Signal ACK

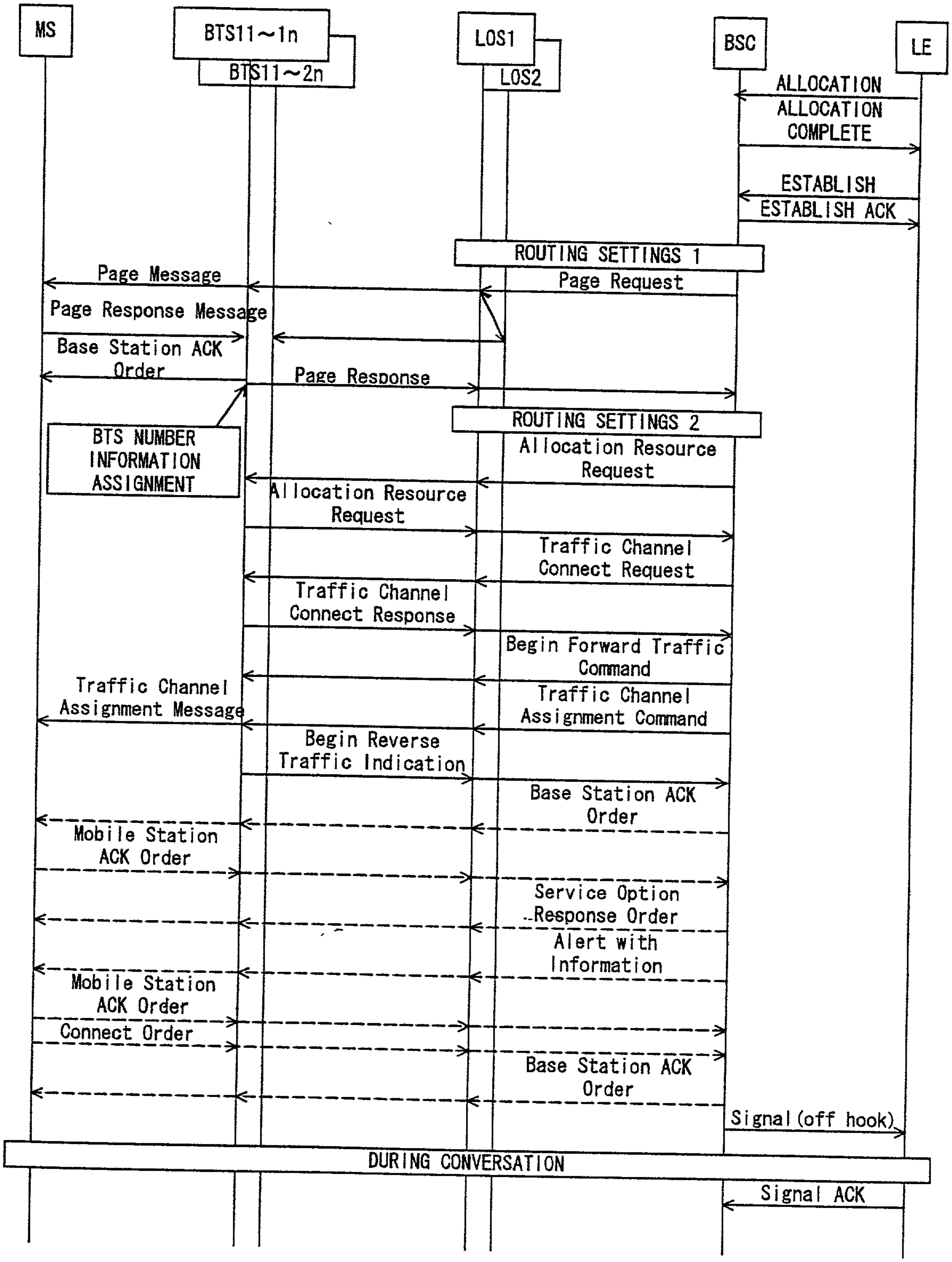
F I G. 2 1


MS
BTS11～1n
BTS11～2n
LOS1
LOS2
BSC
LE
ALLOCATION
ALLOCATION COMPLETE
ESTABLISH
ESTABLISH ACK
ROUTING SETTINGS
Page Message
Page Request
Page Response Message
Base Station ACK Order
Page Response
Allocation Resource Request
Allocation Resource Request
Traffic Channel Connect Request
Traffic Channel Connect Request
Begin Forward Traffic Command
Traffic Channel Assignment Message
Traffic Channel Assignment Command
Begin Reverse Traffic Indication
Base Station ACK Order
Mobile Station ACK Order
Service Option Response Order
Alert with Information
Mobile Station ACK Order
Connect Order
Base Station ACK Order
Signal(off hook)
DURING CONVERSATION
Signal ACK

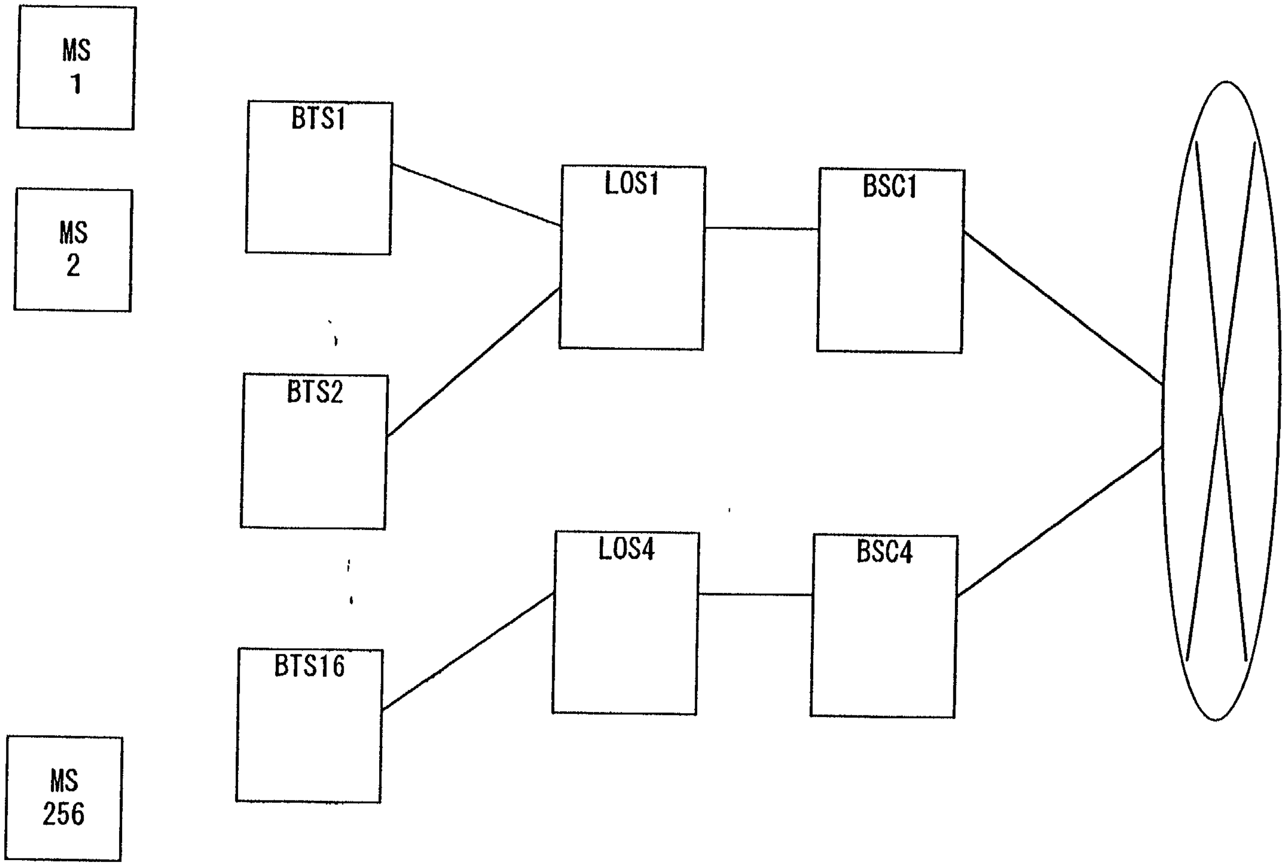
F I G. 2 2


MS
BTS11～1n
LOS1
BSC
LE
Origination Message
Base Station ACK Order
Origination Indication
BTS NUMBER INFORMATION ASSIGNMENT
ESTABLISH
ESTABLISH ACK
ALLOCATION
ALLOCATION COMPLETE
ROUTING SETTINGS
Allocation Resource Request
Allocation Resource Request
Traffic Channel Connect Request
Traffic Channel Connect Response
Begin Forward Traffic Command
Traffic Channel Assignment Message
Traffic Channel Assignment Command
Begin Reverse Traffic Indication
Base Station ACK Order
Mobile Station ACK Order
Service Option Response Order
Signal
Signal
Ring Back Tone
Signal ACK
Signal(reverse)
DURING CONVERSATION
Signal ACK

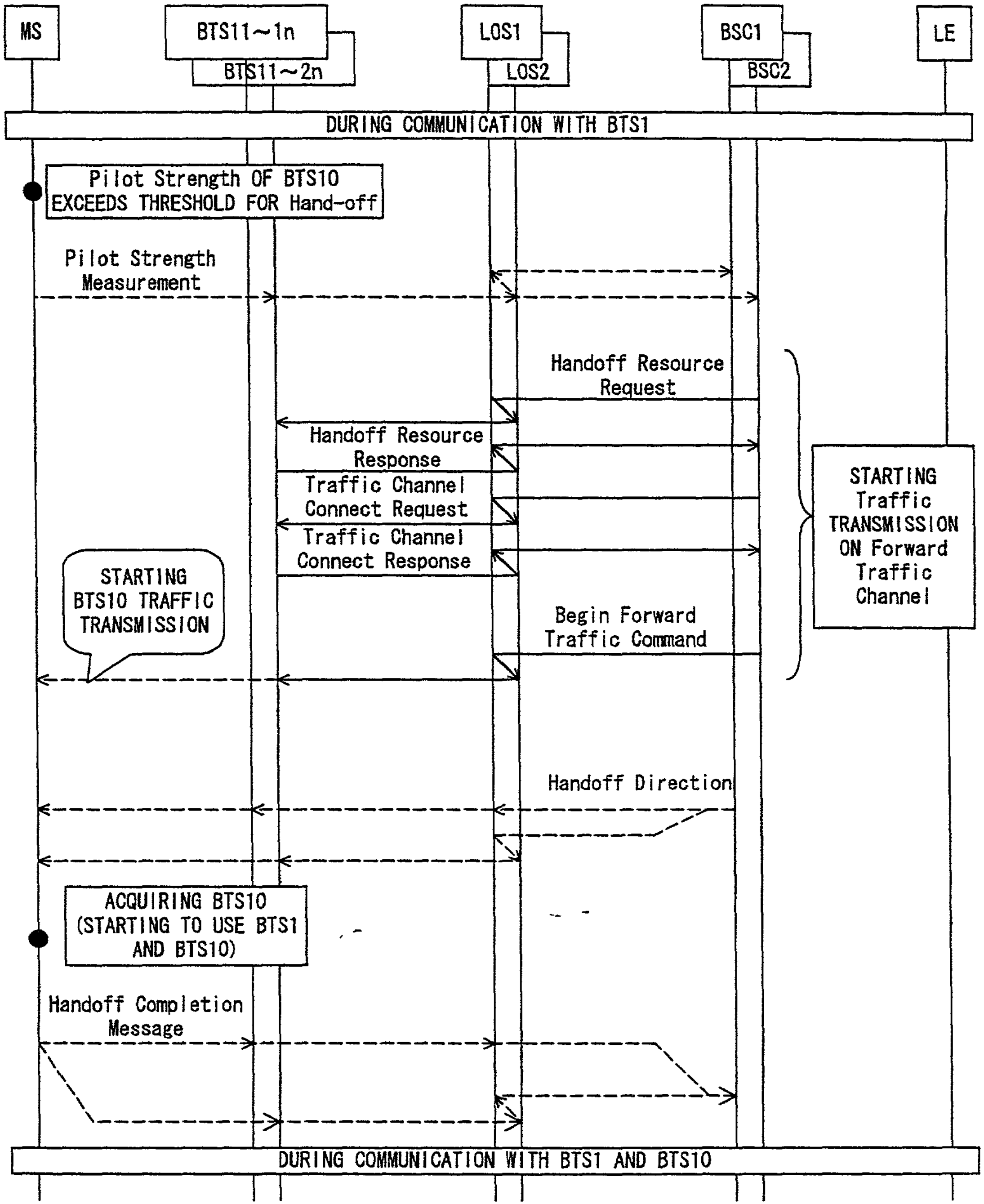
F I G. 2 3


MS
BTS11～1n
BTS11～2n
LOS1
LOS2
BSC
LE
ALLOCATION
ALLOCATION COMPLETE
ESTABLISH
ESTABLISH ACK
ROUTING SETTINGS 1
Page Message
Page Request
Page Response Message
Base Station ACK Order
Page Response
BTS NUMBER INFORMATION ASSIGNMENT
ROUTING SETTINGS 2
Allocation Resource Request
Allocation Resource Request
Traffic Channel Connect Request
Traffic Channel Connect Response
Begin Forward Traffic Command
Traffic Channel Assignment Message
Traffic Channel Assignment Command
Begin Reverse Traffic Indication
Base Station ACK Order
Mobile Station ACK Order
Service Option Response Order
Alert with Information
Mobile Station ACK Order
Connect Order
Base Station ACK Order
Signal (off hook)
DURING CONVERSATION
Signal ACK

F I G. 2 4



F I G. 2 5



(CONTINUED TO NEXT

FIG. 26

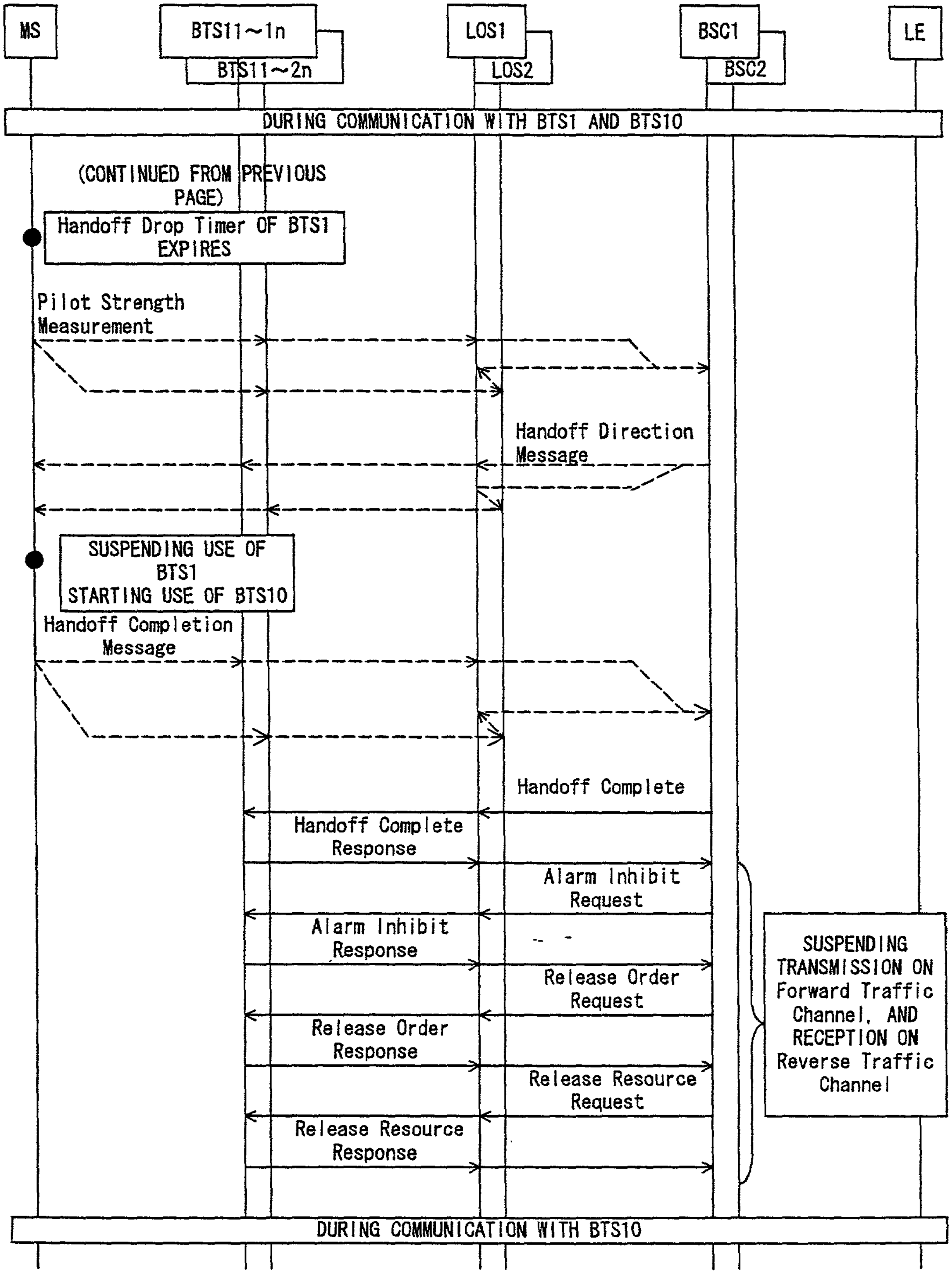
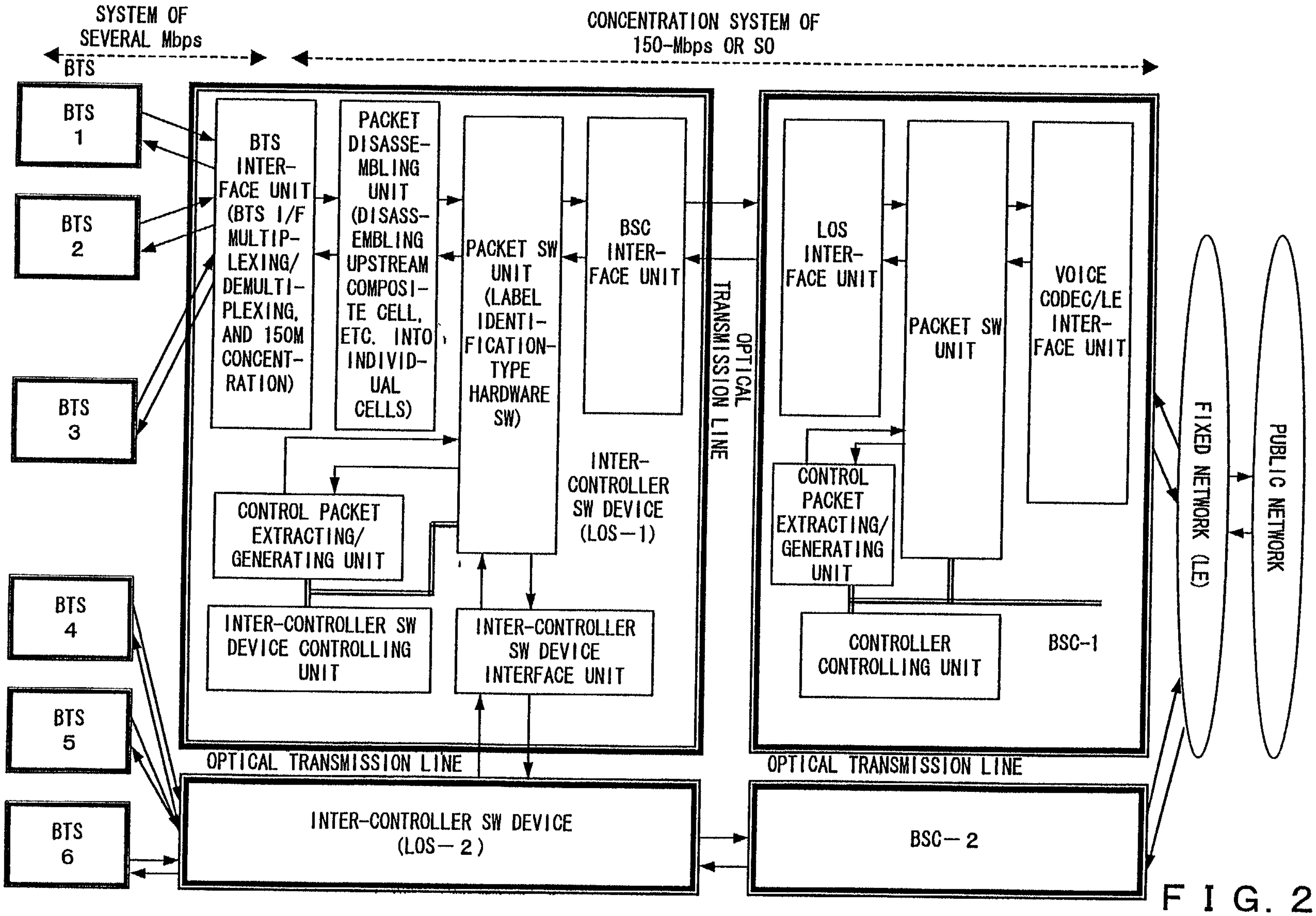
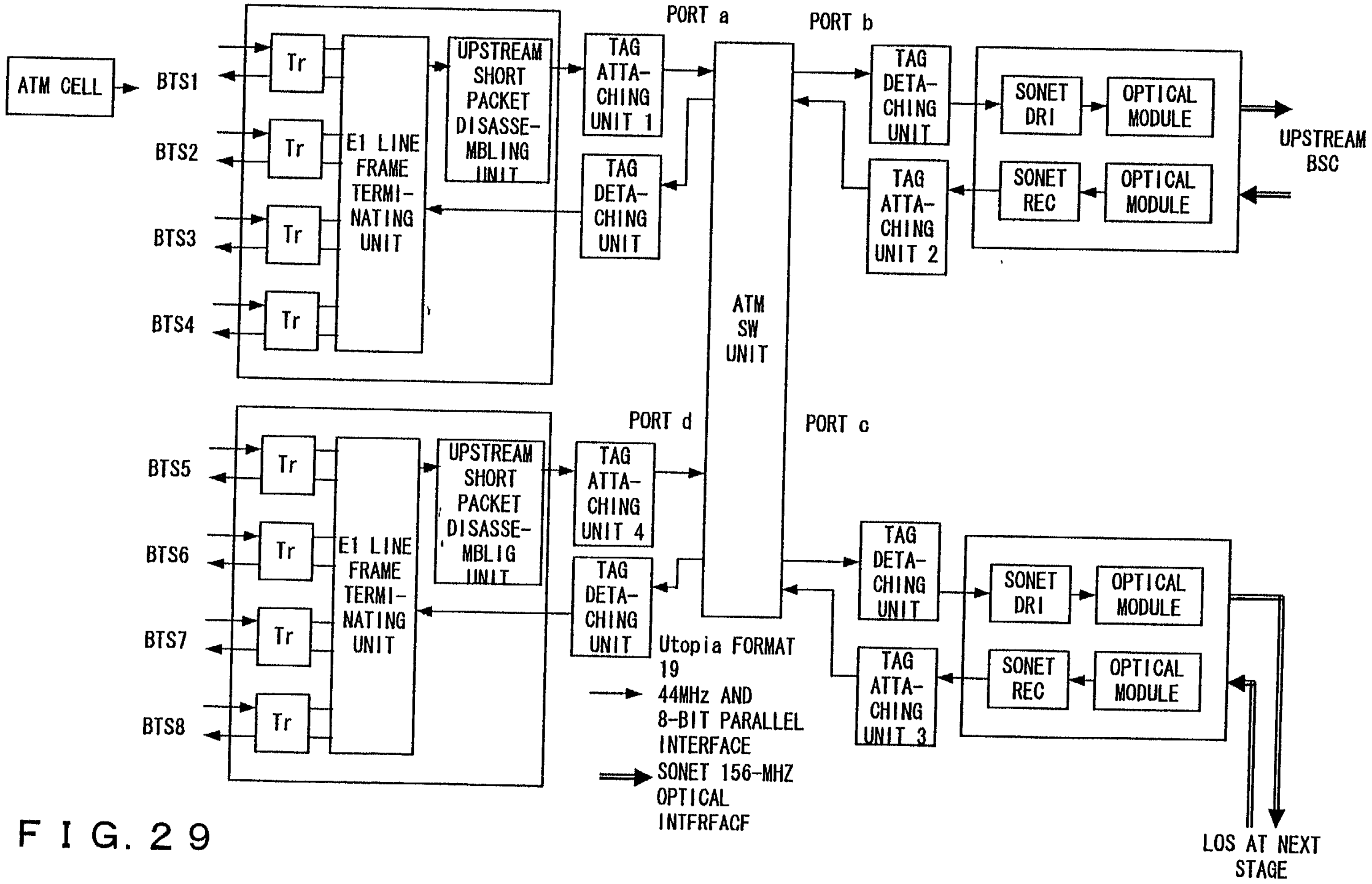

MS
BTS11～1n
BTS11～2n
LOS1
LOS2
BSC1
BSC2
LE
DURING COMMUNICATION WITH BTS1 AND BTS10
(CONTINUED FROM PREVIOUS PAGE)
Handoff Drop Timer OF BTS1 EXPIRES
Pilot Strength Measurement
Handoff Direction Message
SUSPENDING USE OF BTS1
STARTING USE OF BTS10
Handoff Completion Message
Handoff Complete
Handoff Complete Response
Alarm Inhibit Request
Alarm Inhibit Response
Release Order Request
Release Order Response
Release Resource Request
Release Resource Response
SUSPENDING TRANSMISSION ON Forward Traffic Channel, AND RECEPTION ON Reverse Traffic Channel
DURING COMMUNICATION WITH BTS10

FIG. 27


SYSTEM OF SEVERAL Mbps
BTS
CONCENTRATION SYSTEM OF 150-Mbps OR SO
BTS 1
BTS 2
BTS 3
BTS 4
BTS 5
BTS 6
BTS INTER-FACE UNIT (BTS I/F MULTIP-LEXING/ DEMULTI-PLEXING, AND 150M CONCENT-RATION)
PACKET DISASSE-MBLING UNIT (DISASS-EMBLING UPSTREAM COMPOSI-TE CELL, ETC. INTO INDIVID-UAL CELLS)
PACKET SW UNIT (LABEL IDENTI-FICATION-TYPE HARDWARE SW)
BSC INTER-FACE UNIT
INTER-CONTROLLER SW DEVICE (LOS−1)
CONTROL PACKET EXTRACTING/ GENERATING UNIT
INTER-CONTROLLER SW DEVICE CONTROLLING UNIT
INTER-CONTROLLER SW DEVICE INTERFACE UNIT
OPTICAL TRANSMISSION LINE
INTER-CONTROLLER SW DEVICE (LOS−2)
OPTICAL TRANSMISSION LINE
LOS INTER-FACE UNIT
PACKET SW UNIT
VOICE CODEC/LE INTER-FACE UNIT
CONTROL PACKET EXTRACTING/ GENERATING UNIT
CONTROLLER CONTROLLING UNIT
BSC-1
OPTICAL TRANSMISSION LINE
BSC−2
FIXED NETWORK (LE)
PUBLIC NETWORK

F I G. 2 8


ATM CELL
BTS1
BTS2
BTS3
BTS4
BTS5
BTS6
BTS7
BTS8
Tr
E1 LINE FRAME TERMI-NATING UNIT
UPSTREAM SHORT PACKET DISASSE-MBLING UNIT
UPSTREAM SHORT PACKET DISASSE-MBLIG UNIT
TAG ATTA-CHING UNIT 1
TAG DETA-CHING UNIT
TAG ATTA-CHING UNIT 4
PORT a
PORT b
PORT c
PORT d
ATM SW UNIT
TAG ATTA-CHING UNIT 2
TAG ATTA-CHING UNIT 3
SONET DRI
SONET REC
OPTICAL MODULE
UPSTREAM BSC
LOS AT NEXT STAGE
Utopia FORMAT 19
44MHz AND 8-BIT PARALLEL INTERFACE
SONET 156-MHZ OPTICAL INTERFACF

F I G. 2 9

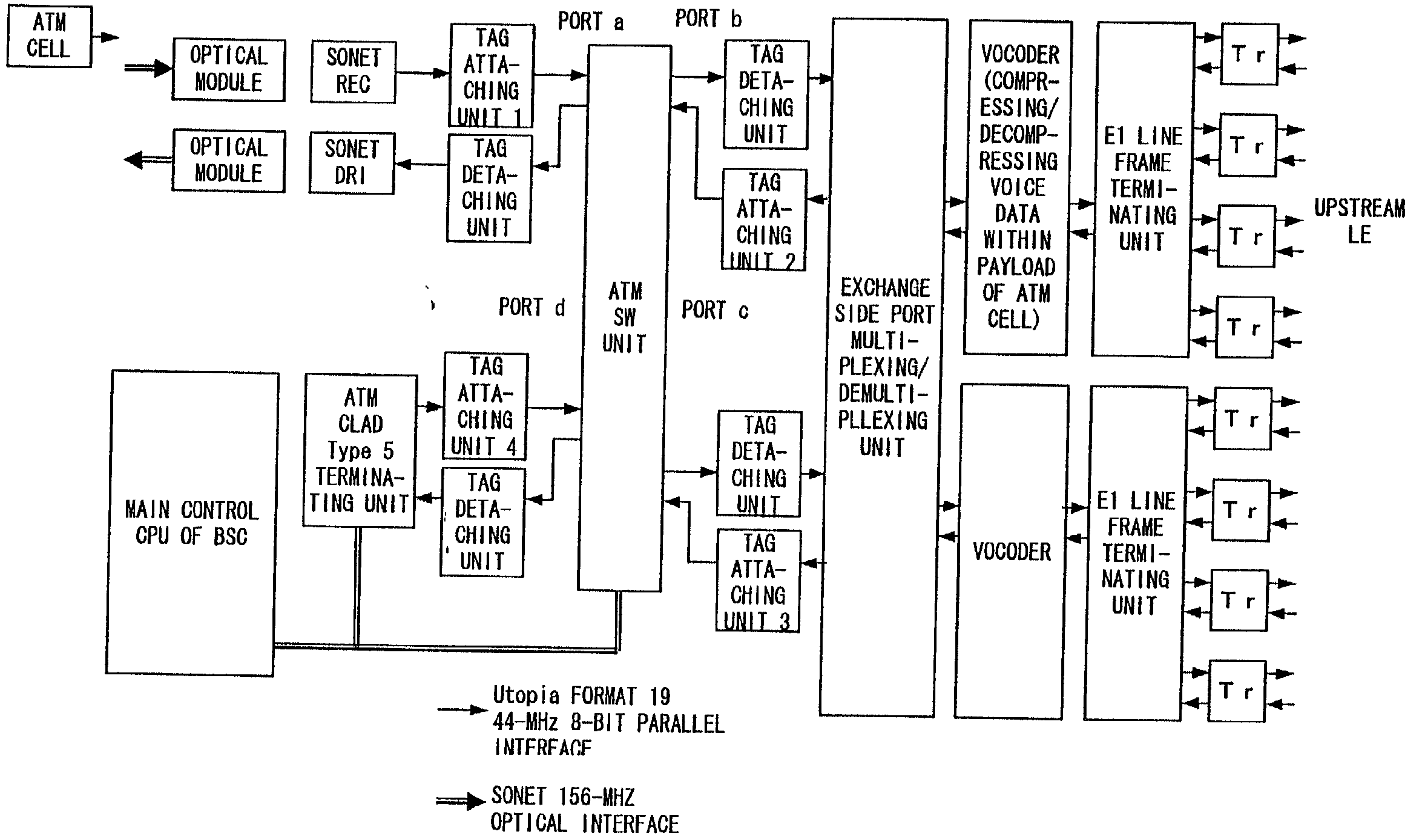

ATM CELL
OPTICAL MODULE
OPTICAL MODULE
SONET REC
SONET DRI
TAG ATTA-CHING UNIT 1
TAG DETA-CHING UNIT
PORT a
PORT b
PORT c
PORT d
ATM SW UNIT
TAG DETA-CHING UNIT
TAG ATTA-CHING UNIT 2
TAG DETA-CHING UNIT
TAG ATTA-CHING UNIT 3
MAIN CONTROL CPU OF BSC
ATM CLAD Type 5 TERMINA-TING UNIT
TAG ATTA-CHING UNIT 4
TAG DETA-CHING UNIT
EXCHANGE SIDE PORT MULTI-PLEXING/ DEMULTI-PLLEXING UNIT
VOCODER (COMPR-ESSING/ DECOMP-RESSING VOICE DATA WITHIN PAYLOAD OF ATM CELL)
VOCODER
E1 LINE FRAME TERMI-NATING UNIT
E1 LINE FRAME TERMI-NATING UNIT
T r
T r
T r
T r
T r
T r
T r
T r
UPSTREAM LE
Utopia FORMAT 19 44-MHz 8-BIT PARALLEL INTERFACE
SONET 156-MHZ OPTICAL INTERFACE

FIG. 30

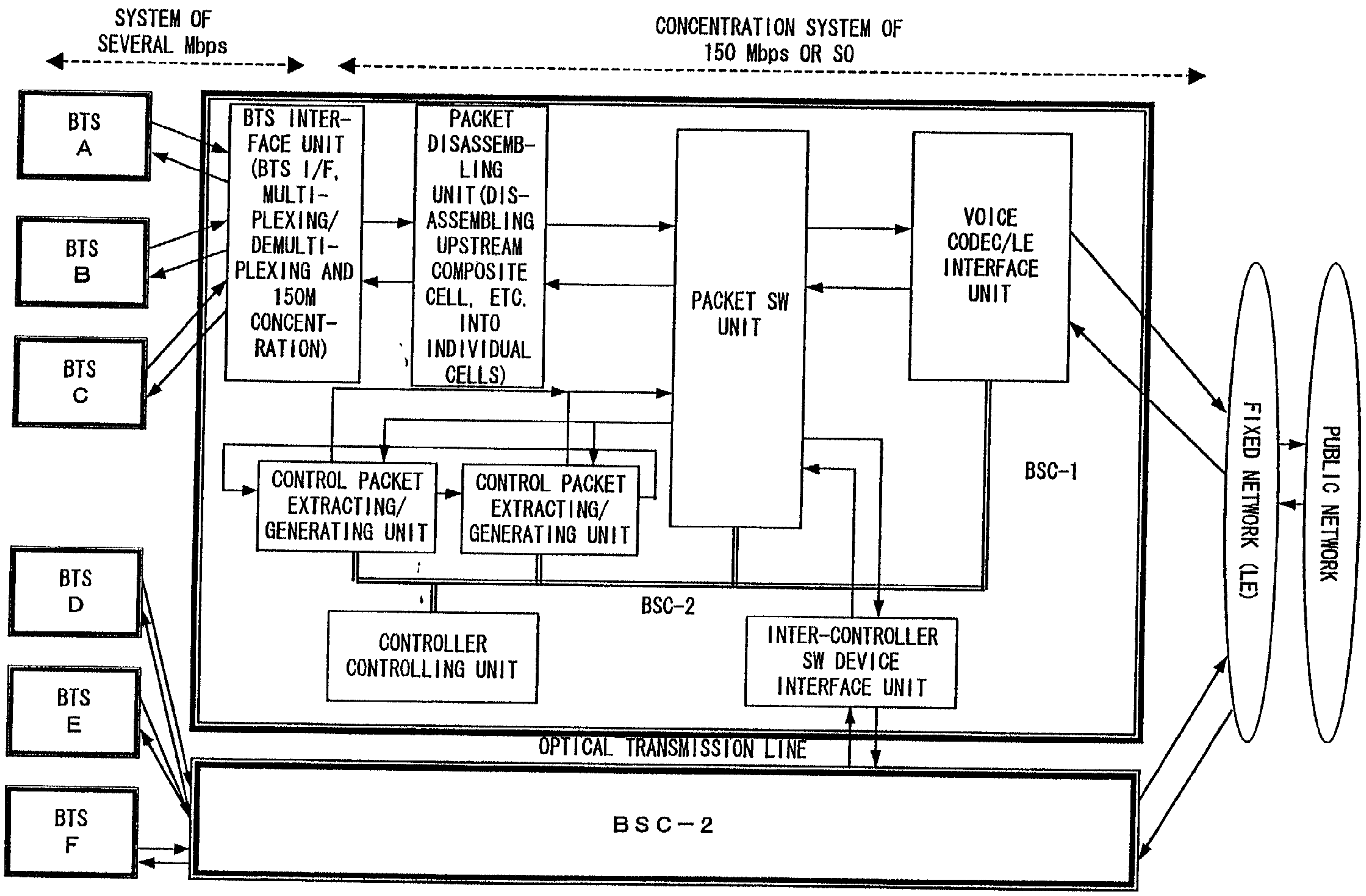
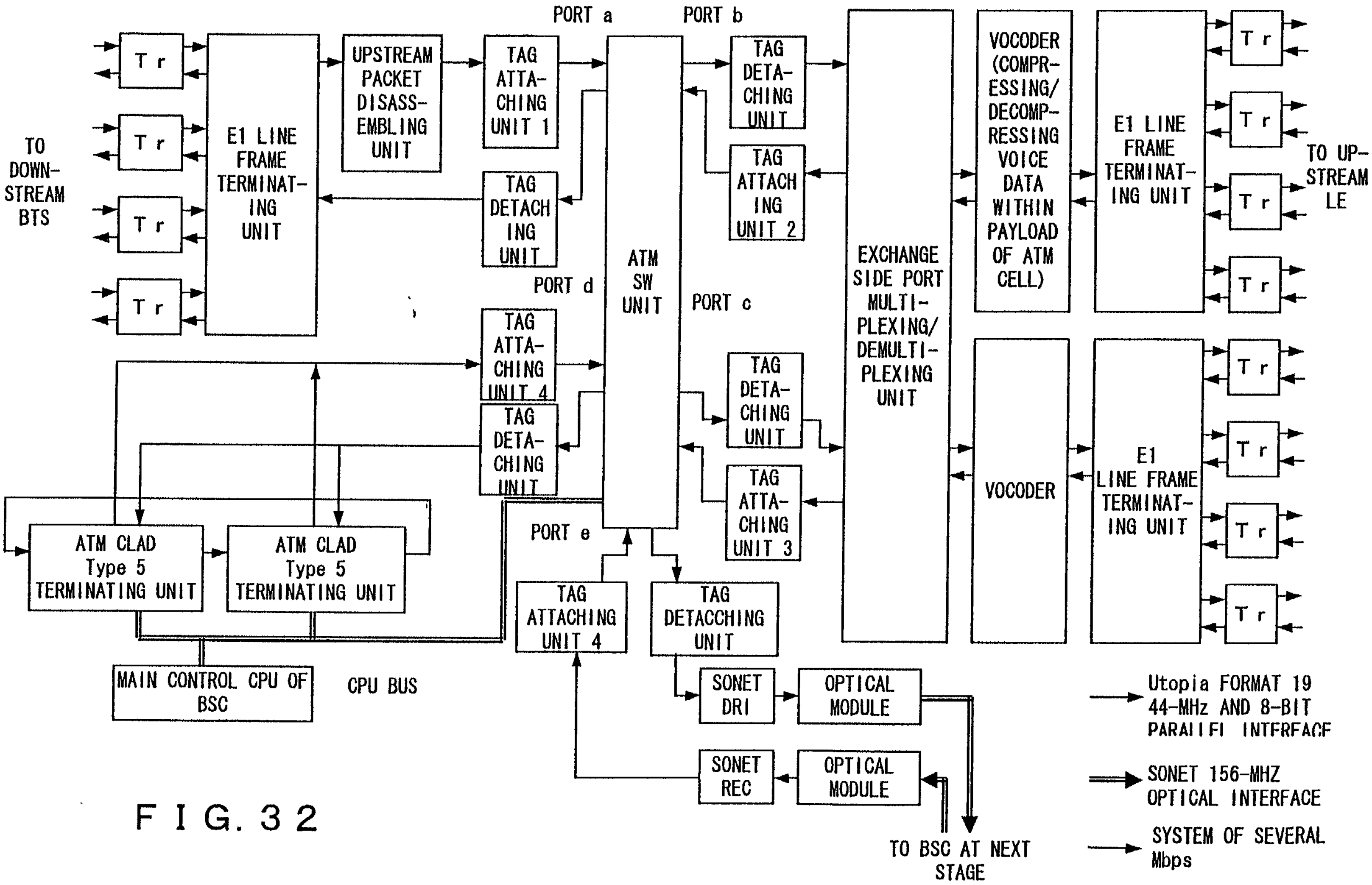
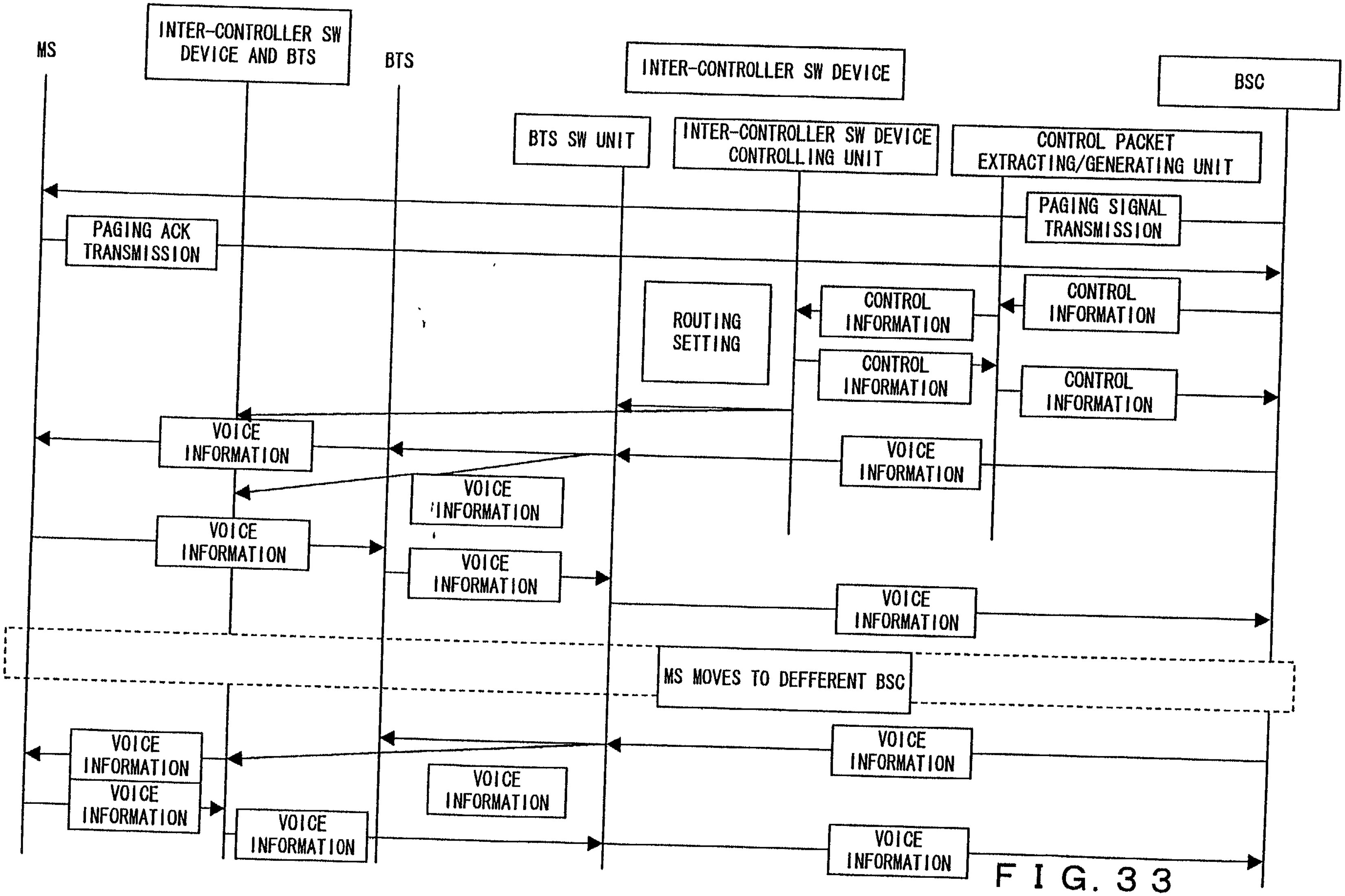

SYSTEM OF SEVERAL Mbps
CONCENTRATION SYSTEM OF 150 Mbps OR SO
BTS A
BTS B
BTS C
BTS D
BTS E
BTS F
BTS INTER-FACE UNIT (BTS I/F, MULTI-PLEXING/DEMULTI-PLEXING AND 150M CONCENT-RATION)
PACKET DISASSEMB-LING UNIT(DIS-ASSEMBLING UPSTREAM COMPOSITE CELL, ETC. INTO INDIVIDUAL CELLS)
PACKET SW UNIT
VOICE CODEC/LE INTERFACE UNIT
BSC-1
CONTROL PACKET EXTRACTING/GENERATING UNIT
CONTROL PACKET EXTRACTING/GENERATING UNIT
BSC-2
CONTROLLER CONTROLLING UNIT
INTER-CONTROLLER SW DEVICE INTERFACE UNIT
OPTICAL TRANSMISSION LINE
BSC-2
FIXED NETWORK (LE)
PUBLIC NETWORK

FIG. 31

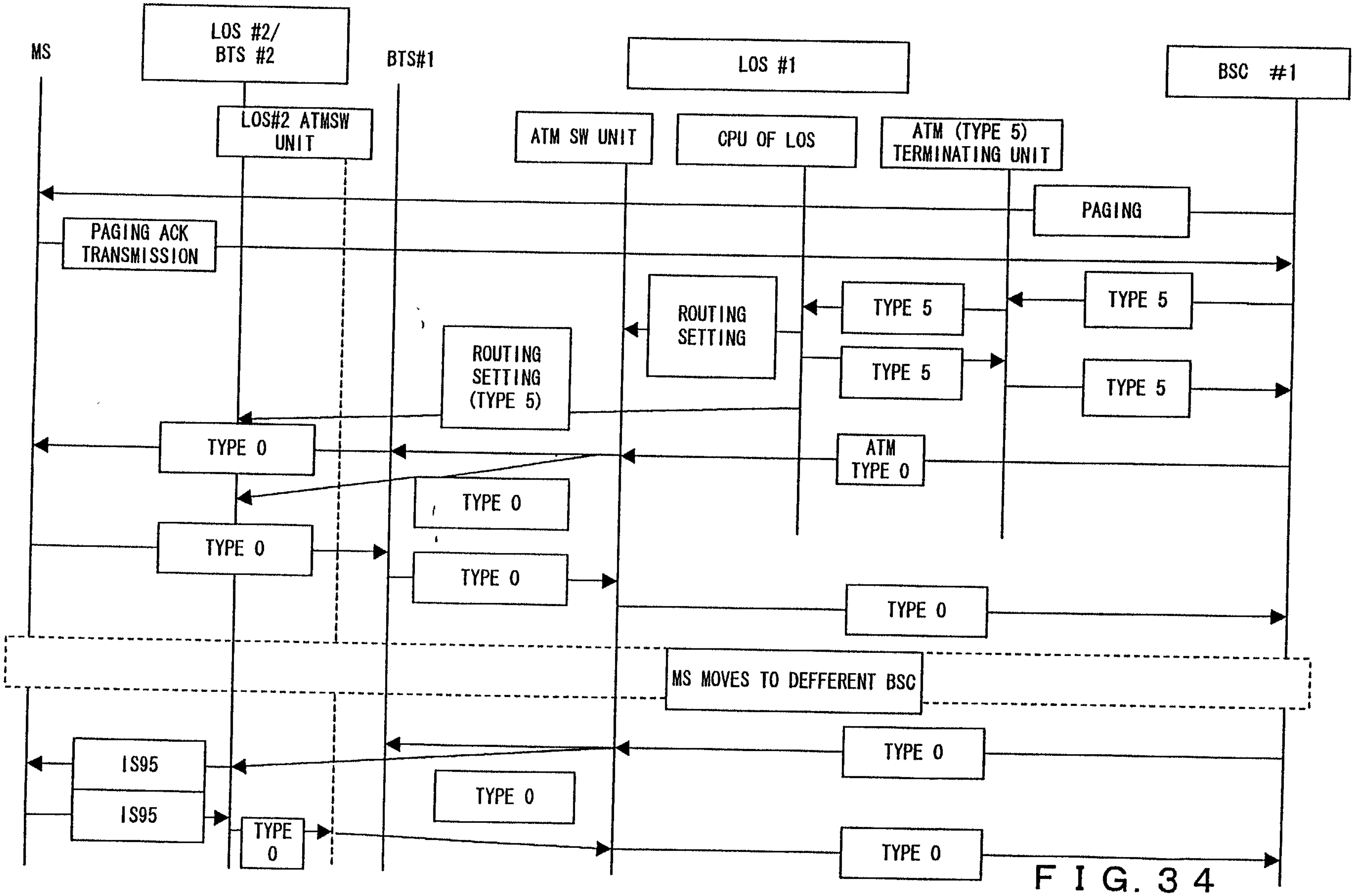
09918955.073101



F I G. 3 2


MS
INTER-CONTROLLER SW DEVICE AND BTS
BTS
INTER-CONTROLLER SW DEVICE
BSC
BTS SW UNIT
INTER-CONTROLLER SW DEVICE CONTROLLING UNIT
CONTROL PACKET EXTRACTING/GENERATING UNIT
PAGING SIGNAL TRANSMISSION
PAGING ACK TRANSMISSION
CONTROL INFORMATION
CONTROL INFORMATION
ROUTING SETTING
CONTROL INFORMATION
CONTROL INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
MS MOVES TO DEFFERENT BSC
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION
VOICE INFORMATION

F I G. 3 3


MS
LOS #2/ BTS #2
LOS#2 ATMSW UNIT
BTS#1
LOS #1
ATM SW UNIT
CPU OF LOS
ATM (TYPE 5) TERMINATING UNIT
BSC #1
PAGING
PAGING ACK TRANSMISSION
TYPE 5
TYPE 5
ROUTING SETTING
TYPE 5
TYPE 5
ROUTING SETTING (TYPE 5)
ATM TYPE 0
TYPE 0
TYPE 0
TYPE 0
TYPE 0
TYPE 0
MS MOVES TO DEFFERENT BSC
TYPE 0
IS95
TYPE 0
IS95
TYPE 0
TYPE 0

F I G. 3 4